

Retail Deliveries Slackening

Sales Upturn Seen Awaiting New Model Announcements



E. P. Chalfant elected president of the American Trade Assoc. Executives

by Athel F. Denham

Detroit Editor, Automotive Industries

Domestic retail deliveries of passenger cars took a further downward trend after the middle of September in line with normal seasonal tendencies. A decline at this period of the month clearly indicates that a definite fall slackening in sales has set in.

It now appears highly doubtful that there will be any reversal of the downward trend until new model announcement time unless price reductions are announced for clean-up purposes. Since most new model announcements are not expected until late in the year, and since new car stocks are not exceptionally heavy for leading makes, it is not likely that either of these developments will occur in the next 60 days.

The trend of production during the week ending Sept. 29 was also downward although some variations were produced due to the balancing of schedules against the previous week at some plants. Most car plants at present are producing largely on an "as needed" basis to supply particular models to districts where stocks on such types are low or exhausted.

Buick reports sales in the second 10 days of September of 1734 units compared with 1780 in the first 10-day period of the month, and 1325 in the corresponding 10-day period last year. Buick has a sales campaign on this month. The factory reports that dealer stocks have been reduced by 2000 since Aug. 10.

Cadillac-La Salle retail sales in the first 20 days in September increased 9 per cent over the same period in August and 48 per cent over last year. Sales increases are largely attributed to the expansion in Cadillac's dealer organization which has taken place this year.

Michigan new car registrations in August totalling 9390 maintained a slight lead over the same month last year, but showed a material drop over the 12,371 registered in July. Virtually

all makes showed losses for the month with only Hupmobile showing an increase over July. Commercial car and truck registrations, on the other hand, in August were up sharply over July. The August total was 1827 against 1313 in July and 915 in August last year. Practically all important truck makers shared in the gain.

Hupp Stockholders Meeting Postponed

The Hupp Motor Car Corp. stockholders' meeting scheduled for last Wednesday was again postponed because of a lack of sufficient proxies. Wednesday, Oct. 3, has been set as the meeting date. Originally this meeting was to have been held during the second week of September, but as reported in *Automotive Industries* of Sept. 15, was called off for the same reason as the present postponement.

NLRB Will Haul Houde Into Court

NRA Making "No Issue" Over Company Refusal To Give Up Blue Eagle

Court action against the Houde Engineering Corp. for its refusal to recognize the majority representation ruling of the National Labor Relations Board became a practical certainty this week when it was announced that the Department of Justice is preparing a case against the Buffalo manufacturer. Chairman Garrison of NLRB revealed that action would be brought in the Federal District Court of Western New York at Buffalo but stated that he did not know whether it would be civil or criminal.

Thus the first step has been taken along the road which must be followed if the Supreme Court is to decide whether Section 7A means that the representatives elected by the majority shall bargain for all the workers, or minority groups and individuals have the right to bargain for themselves. Automotive interests and industry generally are solidly aligned behind the latter viewpoint.

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Gyroscopic Torques in Independent Suspensions are analyzed on page 380

A critical appraisal of Combustion Chamber designs in Diesels will be found on page 384

How Pontiac Connecting Rods are automatically balanced is shown on page 391

Industry Has Best August in 4 Years; 1934 to Be Biggest Year Since 1930

Total production of cars and trucks in the United States and Canada in August was 244,713, the largest total for that month since 1929.

In the first eight months, production amounted to 2,318,826, a gain over the corresponding period last year of 54.1 per cent and of 18 per cent over 1933's full year production. Moreover the eight-month output total was within 150,000 units of 1931 production and there is no doubt that year's mark has already been passed in September. In view of these accomplishments, it is now practically certain that 1934 output will exceed 2,750,000 and may verge on 3,000,000. Much depends, of course, on the dates on which the big volume producers announce their 1935 models and the speed with which they get them into production.

August production was 11.8 per cent behind July but 2.3 per cent ahead of the same month last year. The decline in the total from July was due entirely to a contraction in passenger car output, however, as truck production in August showed an increase of 18.7 per cent over the preceding month and of 26.4 over August, 1933. Passenger car output was down 2.9 per cent from last year and 18 per cent from July.

At the end of eight months, passenger car production for the year was 50 per cent ahead of the same period last year, while truck output increased 76.7 per cent. The detail figures are given in the following table.

(U. S. and Canada)

| | Cars | Trucks | Total Motor Vehicles |
|-----------------|-----------|---------|----------------------|
| Aug., 1934 | 190,825 | 53,888 | 244,713 |
| July, 1934 | 232,275 | 45,415 | 277,690 |
| Aug., 1933 | 196,333 | 42,601 | 238,934 |
| 8 months, 1934. | 1,890,888 | 427,938 | 2,318,826 |
| 8 months, 1933. | 1,261,212 | 241,995 | 1,503,207 |

Canadian 8 Mos. Output Nearly Doubles '33 Total

Canada's automobile production for the first eight months of the current year is within shooting distance of the combined totals for the whole of 1933 and 1932. To date this year 103,102 units have been produced in the Canadian plants against 65,924 in 1933 and 60,816 in 1932.

While August production ran approximately 2000 units behind the July output, it remained comfortably ahead of the total for the corresponding month of last year and two years ago. August's output was 9904 compared with 6079 for the same month of 1933, and 11,114

for July. Of the August production total 7325 were passenger cars and 2579 trucks. Imports of automobiles into the Dominion during August numbered 189 compared with 288 in the previous months. Also the export total showed a falling off for last month. This figure was 3567 or approximately half the July total which was 6598.

S. C. Bray Named Pontiac Sales Promotion Manager

S. C. Bray has been appointed sales promotion manager of Pontiac Motor Company by A. W. L. Gilpin, general



S. C. Bray

Upturn Sure If Santa Goes to Bed Says Ford

Mr. Ford, according to the Associated Press, was asked the other day if he thought a business upturn would show itself this winter.

"If Santa Claus goes to bed, it will," he replied.

"Who do you mean by Santa Claus? The Government?" he was asked.

"You know dang well who I mean," was the rejoinder.

This facetious bit of dialogue took place while the Dearborn manufacturer was attending ceremonies dedicating a memorial to William Holmes McGuffey, immortal author of "McGuffey's Reader."

sales manager. Mr. Bray succeeds L. W. Slack who resigned.

Since last May Mr. Bray has served as assistant sales promotion manager with headquarters in the central office. For three years prior to that time he was a member of the Central Office Department.

W. H. Graves on ASTM Die-Cast Committee

J. R. Townsend, General Development Laboratory, Bell Telephone Laboratories, Inc., has been elected chairman of Committee B-6 on Die-Cast Metals and Alloys, of the American Society for Testing Materials, with W. H. Graves, chief metallurgist of Packard Motor Car Co., as vice chairman.

Passenger Car Production by Wholesale Price Classes (U. S. and Canada)

Eight Months 1934 and 1933 Compared

| | 1934 | 1933 | Per cent change | Per cent of Total 1934 | Per cent of Total 1933 |
|------------------------|-----------|-----------|-----------------|------------------------|------------------------|
| \$500 and under | 1,231,409 | 1,026,700 | + 20.1 | 65.12 | 81.40 |
| \$501-\$750 | 568,042 | 180,338 | + 215.0 | 30.05 | 14.30 |
| \$751-\$1,000 | 55,009 | 25,339 | + 117.5 | 2.91 | 2.01 |
| \$1,001-\$1,500 | 23,143 | 14,324 | + 61.4 | 1.22 | 1.14 |
| \$1,501-\$2,000 | 6,333 | 7,247 | - 12.5 | .33 | .57 |
| \$2,001-\$3,000 | 5,224 | 5,912 | - 11.5 | .28 | .47 |
| \$3,001 and over | 1,728 | 1,352 | + 27.6 | .09 | .11 |
| Total | 1,890,888 | 1,261,212 | + 50.0 | 100.00 | 100.00 |

Truck Production by Capacities (U. S. and Canada)

| | 1934 | 1933 | Per cent change | Per cent of Total 1934 | Per cent of Total 1933 |
|-------------------------|---------|---------|-----------------|------------------------|------------------------|
| 1½ tons and less | 396,305 | 224,844 | + 76.3 | 92.62 | 92.91 |
| 2-3 tons | 26,321 | 14,204 | + 85.2 | 6.15 | 5.87 |
| 3½ tons and over | 3,787 | 2,112 | + 78.2 | .88 | .87 |
| Special and buses | 1,502 | 835 | + 79.6 | .35 | .35 |
| Total | 427,915 | 241,995 | + 77.0 | 100.00 | 100.00 |

Truck Makers Meddle With Operating Problems, Eastman Charges at Meeting

Asserting that motor truck opinion has been shaped too much by those who build trucks rather than by those who operate them, Joseph B. Eastman, Federal Coordinator of Transportation, addressing the annual convention of the National Association of Motor Bus Operators in Cleveland last week, reiterated his belief in the necessity for "coordinated regulation" of all forms of transportation by the Interstate Commerce Commission.

The need for some manner of national regulation has been recognized by the trucking industry in its NRA code, Mr. Eastman stated. Continuing, he declared that while code regulation has much to its credit, "it cannot meet the needs of a public regulation which must protect the interests, not only of the industry itself, but of many others outside of the industry, including the general public interest." This criticism borders not only on being an indictment of the whole code set-up but also an argument for government regulation of all business.

Mr. Eastman's fling at the legislative activities of the truck makers, of course, overlooks the fact that they had no alternative but to inject themselves into the situation to protect their markets and their customers. Prior to NRA, there was no national trucking organization and the really effective local associations were few and far between. Under such circumstances, it takes no vivid imagination to picture what the highly organized railroads would have done to motor trucking if the manufacturers had stood on the side-lines.

In support of his views on federal regulation of interstate motor carriers, Mr. Eastman contended that experience had shown that the public interest demanded such control of transportation agencies. He also asserted that the motor carriers themselves needed such regulation to protect them against over-development and the destructive competition of the irresponsible and of other transportation agencies including the railroads. Shippers, travelers, labor and investors all need the protecting cloak of regulation, Mr. Eastman holds.

The Coordinator is opposed to making the rates of one form of transportation a standard for another form. On this point, he believes that the basic rate should normally be determined by the operations of the agency with the lowest costs. Moreover, he said effective protection against rates which disregard costs is provided by the fact that industries of any size always have the opportunity of operating their own trucks.

As to the contention that small operators will not be able to contend against the high-priced talent of the railroads when they appear before the Commission, the coordinator indicated that he felt that it would not work out that way in practice. Furthermore, he believes that the small operator can protect himself in any case by organization as the smaller railroads have done. If the Commission is charged with regulating all forms of transportation, Mr. Eastman believes that any of the alleged "railroad-mindedness" with which it has been charged, will be quickly dissipated.

"The essential thing," Mr. Eastman concluded, "is coordinated regulation of all forms of transportation."

ALB Issues Statement Clarifying July Order

To remove any misunderstanding relative to its order of July 17, suspending nominations and elections of representatives under the representation plan the Automotive Labor Board issued the following statement at Detroit, Sept. 18.

"On July 17, 1934, the Board made an order suspending nominating and electing representatives under representation plans. Through misunderstanding certain elections have taken place, the effect of which is not clear. In order to remove all misunderstanding, the Board rules that these elections are not valid. The Board rules further that, as a temporary expedient, and in order to avoid confusion, until the Board shall issue rules and regulations, and until elections under those rules and regulations shall take place under the supervision of the Board, the managements may meet with the existing representatives as unofficial interim representatives of such employees as wish to have these representatives act for them.

"In order to inform all interested parties of this ruling, and to avoid further possible misunderstanding, the Board directs that the order of July 17, 1934, and this order be posted on all bulletin boards in all plants."

Factory Men Oppose More US Truck Laws

Marvin Reports Feeling Is That Code and I.C.C. Would Not Be Harmonious

Automobile factory traffic directors are reported to be unfavorable to enactment of further Federal laws affecting trucking operations, according to J. S. Marvin of the N.A.C.C. Mr. Marvin was in Chicago during the past week attending the sessions of the National Industrial Traffic League where he had a first-hand opportunity to study the reactions of the factory men to such proposals.

Mr. Marvin pointed out that factory traffic directors who use motor trucks for various services to supplement their rail shipments, feel there is no lack of regulation of this type of transportation at present. Forty-two states undertake some form of control over rates, practically every state regulates the size, weight and speed and determines the taxes and fees of such motor vehicles.

"In addition," Mr. Marvin said, "we now have the Trucking Code, which is a Federal Law, and it is difficult to see what could be accomplished in the interest of the public by additional Federal legislation, and how the code, which provides for rates at not less than cost as a measure of stability, could operate in harmony with additional supervision by the Interstate Commerce Commission.

"Obviously the only sound method of ascertaining the economic position of the truck is in basing its charges on its costs. Comparison with rail rates is misleading because of the dissimilarity of trucking service and railroad service."

Champion Soft Ball Team

Employees of Nash Motors Co. who have gone through a season of soft ball play almost undefeated to win the American championship in this sport



Asst. Secy. of Commerce Holds Bars on Secret Discounts Should Be Kept

If experience with NRA under General Johnson has demonstrated anything, it has shown that something more than relaxation of the anti-trust laws is needed to make devices for controlling prices work effectively. For years prior to the enactment of the Recovery Act, many business men felt that if the legal bars on agreements on prices were let down, it would solve many problems. Under NIRA they were let down in many industries and the results have been disillusioning.

That the administration is coming to about the same conclusion was indicated in statement made this week by John Dickinson, Assistant Secretary of Commerce, which perhaps gives an inkling of what the new policy on price fixing may be. The statement takes on added importance because Mr. Dickinson has been frequently included in the membership list of the Brain Trust.

Acknowledging that there was much opposition to code price-fixing, Mr. Dickinson said that most business men have round that to raise prices by agreement is not a cure for depression. Condemnation of price fixing in his opinion, however, should not include condemnation of fair trade practices such as the requirement that prices be open and public and secret discriminations and discounts eliminated.

Another straw that may show the way the wind is blowing is the "liquidated damage" amendment which has been proposed for the car dealers' code as reported last week in *Automotive Industries*. Similar amendments are being considered for other codes. Of course, whether the plan will survive the projected reorganization of NRA is another question.

However the "liquidated damage" program is regarded in some quarters as to step to get the government out from under much of the burden of enforcing trade practices. The plan provides code members can enter into agreements subjecting themselves to fines for violation of code provisions. The fines could be levied, however, only against members who assented to the agreement. Some observers believe that under this plan NRA might take the position that it was up to the industry or trade to secure the necessary assents, and if they could not be obtained, it would be evidence of lack of support for the code by the industry. In that event, it is asserted that NRA might hold that if the members of the industry were not interested in making the code work, there was no reason why Uncle Sam should step in.

Dealer reaction to the liquidated damage plan appears to be apathetic. They

feel that it might have been practical if offered at the outset, but that now it will be impossible to get the real chiselers to assent to any such procedure.

Youth Not "Speed Crazy," GM's Research Reveals

The young people of this country can hardly be called "speed crazy" to judge from the information obtained through General Motors Customer Research activity. A breakdown of the data on an age basis makes it possible to compare the tastes and desires of youth with those of adults. The analysis shows the younger generation wants a top cruising speed only 37/10 m.p.h. greater than that voted for by adults. The general subject of safety was stressed more frequently by youth than by the grown-ups, although the point was frequently made by both groups that an extra margin of speed and pick-up is essential to safety in coping with modern traffic conditions.

Stewart-Warner Sales Up 75% in August

Sales of the Stewart-Warner Corporation and its subsidiaries continue at a level somewhat higher than in 1933, according to Joseph E. Otis, Jr. Following a seasonal recession in July over earlier months in the year, marked improvement was shown in August which has continued during September.

The showing of the parent Stewart-Warner Corporation during 1934 has been particularly encouraging, Mr. Otis added, with sales to date over 75 per cent larger than in the same months of 1933. The automotive parts division of the parent company has recently received a contract from one of the larger automobile manufacturers which it is expected will add substantially to next season's volume in this division.

August Registrations Up 7% from Last Year

New passenger car registrations for August amounted to 190,000 as compared with 178,661 in August, 1933, and 228,760 in July of this year, according to estimates based on returns from 40 states. August will show an approximate increase of about 7 per cent over the same period last year, but will show

a decline from July of this year of about 17 per cent, which is slightly more than seasonal.

On the basis of these partial returns Chevrolet is in the lead with 54,800 as compared with 55,611 last year, a drop of less than 1 per cent; Ford is second with 53,000 as against 39,140 during August, 1933, an increase of approximately 36 per cent; Plymouth is third with 32,600 units in comparison with 32,003 during last August, an increase of about 2 per cent.

New truck registrations for August amounted to 40,000 as compared with 28,799 during August, 1933, an increase of approximately 40 per cent, according to estimates based on returns from the same 40 states as for passenger cars.

Auto Codes May Call for Time and a Half

Parts Makers See Trouble in Revised Hours Limits

Changes contemplated in the hour and wage provisions of automotive codes are reported to provide for the payment of time and a half for overtime. These reports indicate the work-week maximum for automotive manufacturing may be set at five days of eight hours each for a total of 40 hrs. Any hours worked over eight in one day or 40 in one week would call for time and a half compensation. The maximum amount of overtime permitted, it is understood, however, would not be allowed to exceed 96 hrs. for any one man in six months. This would reduce the absolute maximum to an average of 43 to 44 hrs. per week as against the present 48.

Reports that changes along these lines are in prospect are causing considerable concern, particularly among parts makers. They point out that the new set-up would increase the cost of production on rush orders, would make it impossible to fulfill large emergency orders on schedule, further increase labor turnover by increasing periodical layoffs and temporary employment, etc. Unless compensatory increases in hourly rates were made, it is contended, further weekly wages averaged over the year would almost certainly be reduced. Of course, the changes might also make for greater stability in car maker purchasing which would be desirable but difficult to accomplish.

Considerable weight is attached to these reports because it is believed that NRA is tending to adopt a policy of overtime compensation for hours worked in excess of the nominal maximums in the codes, instead of establishing absolute maximums above which no one may work except in dire emergency, as has been the common practice so far.

USCC Group Urges Scrapping NIRA, Minority Right Surety, Closed Shop Ban

Drastic revision of Section 7a in the public interest and the rights of individual employers and employees at the "earliest practicable moment"; guarantees to minority groups and individuals the right of collective bargaining; freedom for workers from coercive membership in any kind of labor organization as a condition of employment; a ban on "closed" shops, and the dropping of N.I.R.A. for new legislation limiting the powers of government over commerce and industry are urged by the United States Chamber of Commerce committee on the NRA in its preliminary report this week.

Relative to Section 7a and coercion of workers the committee states that it has "reached the very earnest conviction that the public interest as well as the rights of individual employers and individual employees, require amendment at the earliest practicable moment of the so-called labor clauses which, by reason of the requirement of Section 7a . . . are imposed upon the members of each industry that has a code.

"It should be made unmistakable that the collective bargaining which is contemplated is for bargaining with representatives of all groups of employees that desire to act through spokesmen, and that neither the right of the minority group to deal collectively nor the direct right of individual bargaining is precluded. . . . It should be made equally explicit that the right of employees to choose their own representatives is to be free, not merely of coercion on the part of employers, but from coercion from any other source. . . . The condition that employment of any person is not to be made dependent upon membership in one type of employees' organization should be extended to membership, or non-membership, in any type of labor organization."

The present law precludes membership in a company union as a condition of employment, and the committee wants it made equally specific that a person shall not be required to join any other type of labor organization in order to secure employment.

In general the report embodies six major recommendations. They are: (1) That new legislation apply only to business engaged in interstate commerce. (2) That the government take no actual part in actual code making. (3) That the government's powers be restricted to approval or veto of codes. (4) That codes be enforceable only against those signing them, thus removing the government's power to compel compliance of non-signatory employers. (5) That a

codified industry or any member thereof have the right to abrogate a code. (6) That provision be made for minority and even individual collective bargaining, with a ban on "closed" union shops.

There was no indication given at the President's first press conference following his return this week to Washington whether there would be any reaction to this report. However, President Roosevelt did express his displeasure at the Chamber's questionnaire directed at the Administration to determine its attitude and possible policies on vital economic problems. Mr. Roosevelt refused to answer any questions relative to the questionnaire, reported on page 371 of this issue, and showed his pique by saying such questions reminded him of the question "have you stopped beating your wife?"

White Gets Bus Orders Totaling \$1,296,000

White Motor Co. has announced the receipt of orders for new buses totaling \$1,296,000. In a statement the company

says that the "long overdue replacement of equipment in the transit field has definitely started." The order includes 74 of the new type city coaches with "pancake" engines.

The order for the city coaches was obtained at the recent convention of the American Transit Association and totals \$814,000. Eleven customers placed the orders, and range from the Cleveland Railway Co. with one coach to the Trenton, N. J., Transit Co. with an order for 35 of the vehicles. Another big order was received from the War Department for 72 heavy duty trucks, ranging from two to four ton models. The Frank Martz Coach Lines of Wilkes-Barre, Pa., purchased 14 of the White "airstream" coaches.

Hot Water Heater Code Amendment Asked of NRA

The Code Authority of the automobile hot water heater manufacturing industry has applied to the National Recovery Administration for approval of an amendment to its code authorizing the Code Authority to prepare an administrative budget and the basis of contribution to same by members of the industry.

Any criticisms of, objections to, or suggestions concerning this modification must be submitted to Deputy Administrator Jo G. Roberts.

Automotive Leaders Regret Johnson Exit

The announcement of General Johnson's resignation from NRA this week occasioned widespread expressions of regret in automotive circles. This is a tribute to the innate sincerity of the



Gen. Hugh S. Johnson

man since there is no doubt that when he first appeared on the stage as generalissimo of industrial recovery, the first reactions of motordom were far from unanimously favorable.

However, as the industry's contacts

with the General multiplied, admiration and respect for him grew and it is safe to say that he never stood so high in automotive esteem as on the day of his resignation. Many in the automotive industry were in utter disagreement with the basic theories of NIRA, and the intense partisanship displayed by the General in the defense of these theories at times proved irritating. Nevertheless, the industry came to realize that he was honest, courageous and fair-minded and that he would not resort to the hypocrisies so common in the political arena regardless of the personal effects of this policy. The industry differed with his theories, recognized his shortcomings, saw the flaws in the NRA he created, but nevertheless his exit from the Washington scene found motordom ready and willing to express their appreciation of his virtues.

It is commonly believed that the General's resignation was accelerated by his recent charges that textile union leaders violated an agreement when they called a strike. Obviously, this was an indiscretion for a public figure, but it was typical of General Johnson that he should make it.

Census Bureau Reports \$439,144,931 '33 Purchases by Parts Body Makers

The 1933 value of products of manufacturers classified by the Census Bureau as producers of motor vehicle bodies and parts, was \$760,365,196 according to preliminary data released this week by the Government. The classification includes establishments engaged primarily in the manufacture, for sale as such or for transfer to motor vehicle manufacturing and assembly plants, of bodies, parts and assemblies, exclusive of engines, springs, tires, batteries, ignition apparatus, starting and lighting systems, and stamped sheet metal parts which are included in other industries.

Compared with the two previous census years, 1931 and 1929, the 1933 total represents decreases respectively of 19.6 and 51 per cent. This compares with losses in the motor vehicle manufacturing field (*Automotive Industries*, Aug. 18) of 31.5 per cent from 1931 and 70.5 per cent from 1929, these larger proportionate losses evidencing the greater stability of the parts industry due largely to the after-market business enjoyed by many parts makers.

The importance of the manufacturers in this classification as customers of other industries is indicated by the fact that they spent \$439,144,931, 57.7 per cent of their total income, for materials, fuel and purchased electricity. This total was only 15 per cent less than their purchases in 1931, but was 49 per cent less than in 1929.

As an employer of labor, the classification ranks as an important contributor to national purchasing power. It employed an average of 145,656 in 1933 and paid out in wages, exclusive of salaries, \$148,229,993. The reduction in the number of workers was 3 per cent

from 1931 and 34 per cent from 1929. The percentage decreases in payrolls from these two years were 23 and 60.

Due to share-the-work and apparently to somewhat lower wage rates, wages per worker declined from \$1659 in 1929 to \$1286 in 1931 and \$1020 in 1933. After adjustment for changes in the cost of living, real wages were \$1365 and \$1485 in 1933 and 1931 respectively as compared with \$1659 in 1929.

The balance of income after wages and materials available for overhead, interest, dividends, salaries, etc., formed the smallest percentage of value in 1929 when the proportion was 20.5 per cent. This percentage increased to 24.8 in 1931 but declined to 22.8 last year, probably due to higher wage and material costs which because of contracts could not be offset by higher prices.

Bendix Workers Agree To No Pay Boost, Keep Jobs

After securing the assurance of the employees that they will not demand wage increases for the present, Vincent Bendix, president of the Bendix Aviation Corporation, at a mass meeting of the workmen last Friday, stated that all the various Bendix plants will continue in operation despite the financial loss that this will entail. Mr. Bendix explained that demands for lower prices by automobile manufacturers have forced the corporation to ignore existing contracts and slash contract prices on brakes and accessories to an extent that will mean loss on factory operations.

"But," said Mr. Bendix, "we would rather operate at a loss and keep our factories going than maintain prices not agreeable to contracting firms and thus be forced to close our plants and throw our men out of employment. It will not be necessary to cut present wages to reduce the prices, but we must be assured that the present wage scale will continue to be accepted."

Waldo Dane Edenburn

Waldo Dane "Eddie" Edenburn died suddenly last week following an attack of uremic poisoning. His death climaxed a brilliant career in the speedway sport which had its beginning in the pioneer stages of the automobile back in 1905 while he was a newspaper sports writer.

Edenburn was one of the most important of the automobile racing officials as



Waldo Dane Edenburn

director-general of the running of the 500 Mile International Sweepstakes for the last 18 years. As a member of the Contest Board of the American Automobile Association and the Board's representative at the Indianapolis classic, Mr. Edenburn directed the activities of some 150 officials at the great brick speedway each year.

Not only was Edenburn prominently affiliated with the automobile racing world, but he was also a well-known figure in the industry as manager of the Michigan Automotive Trade Association. Also, he was secretary of the Michigan State Advisory Committee of the Motor Vehicle Retailing Code. To motor boating enthusiasts he was as well known as to the speedway fraternity. For many years Mr. Edenburn was a close personal friend of Gar Wood and supervised many boating meets, including the famous Harmsworth Trophy event.

Count de Sakhnoffsky Sails

Count Alexis de Sakhnoffsky, industrial stylist, will sail for Europe on the Olympic, Oct. 5, to observe the new automobile body designs that will be exhibited at the Paris Salon and London's Olympia next month.

Summary of Census Data on Motor Vehicle Parts and Body Makers

| | 1933 | 1931 | 1929 |
|--|---------------|---------------|-----------------|
| 1 Value of products..... | \$760,365,196 | \$945,406,758 | \$1,545,399,408 |
| 2 Wages exclusive of salaries..... | 148,229,993 | 193,770,459 | 368,106,610 |
| 3 Cost of materials, fuel and purchased electricity..... | 439,144,931 | 516,945,484 | 860,706,078 |
| 4 Balance of value after deduction of wage and material costs—available for salaries, taxes, insurance, depreciation, interest, dividends, surplus, etc..... | 172,990,272 | 234,690,815 | 316,586,720 |
| 5 Average No. Wage Earners*..... | 145,656 | 150,649 | 222,181 |
| 6 Wages per worker*..... | 1,020 | 1,286 | 1,659 |
| 7 Real wages, line 6 adjusted for cost of living..... | 1,365 | 1,485 | 1,659 |
| PER CENT OF TOTAL | | | |
| 8 Value of product, line 1..... | 100% | 100% | 100% |
| 9 Wages, line 2..... | 19.5 | 20.5 | 23.8 |
| 10 Materials, line 3..... | 57.7 | 54.7 | 55.7 |
| 11 Balance, line 4..... | 22.8 | 24.8 | 20.5 |
| 12 No. of establishments..... | 696 | 940 | 1,158 |

* Includes part-time workers.

Manufacturers' Association Counters AFL's Move to Control Next Congress

The American Federation of Labor's brazen effort to control and dictate the action of the next Congress by threatening concerted opposition to Congressional candidates who oppose or who refuse to commit themselves on the Federation's legislative program, was countered by the National Association of Manufacturers in a questionnaire broadcast this week.

Specific answers as to how candidates will vote on labor legislation including 7a, social insurance, the 30-hour week, public works programs and the ill-starred Wagner Labor Disputes Bill of the last session have been demanded by the A. F. of L. The Federation makes no bones of the fact that it will fight those candidates who have the temerity to disagree with it or ignore it. Candidates are warned that "the unions and their members in the various Congressional districts and the states where Senators are to be elected will be informed of the answers and requested to vote accordingly. If replies are not received within a reasonable time, it will be inferred that you are opposed to all legislation urged by the American Federation of Labor. . . ."

This smacks of the ruthless strategy that put over prohibition—an organized minority threatening to swing its votes to one side or the other depending upon the candidates' position on class legislation.

On the other hand the N.A.M. describes its questionnaire as "educational" and makes no threats. The association says "It is not a central demand upon all candidates to give a strict accounting to one group by telling how they will vote if elected. This sort of domination by maneuvered minorities is un-American and unwholesome in a democracy. Worthwhile officials will seek to represent all the people."

The A. F. of L. questionnaire included the following questions:

"Will you vote for the extension of the National Recovery Act and retain therein Section 7A, providing for the right to organize and bargain collectively; the prohibition of child labor and the elimination of unfair trade practices?"

"Will you support social justice legislation providing for old age pensions, unemployment insurance, work security and health protection?"

"Will you vote for a measure providing that all codes under the National Recovery Act should contain a 30-hour week and six-hour day?"

"Will you support legislation similar to the Wagner-Lewis bill introduced in the last session of Congress providing for unemployment insurance?"

"Will you support legislation similar to the Wagner-Connery Labor Dispute Bill with amendments drafted and supported by the American Federation of Labor?"

"Will you support legislation providing appropriations necessary for a public works program as a partial remedy for unemployment and for independent unemployed workers and their families?"

Urging business men to find out now where candidates stand rather than let politics take its course and then get what they can out of complaining over unwise legislation next winter, the N.A.M. posed the following questions:

Do you believe Congress should resume its full legislative and deliberative powers?

Do you favor reducing Government control of the management of private business?

Will you work and vote for an early return to balanced governmental budgets?

Do you believe that employees should be free to join or not to join a legitimate labor organization of any sort without coercion from any source?

Should an individual be free to sell his own labor individually or collectively, as he and his employer may agree to their mutual satisfaction?

Do you believe where collective bargaining exists there should be corresponding collective responsibility for its exercise?

Do you believe in maintaining the Constitutional division of power between the Federal and State Governments?

Do you favor awarding governmental contracts to the lowest responsible bidder, in accordance with law, instead of using contracts to compel acceptance by bidders of governmental policies not specifically provided by law?

Do you believe that the powers of tax-

ation should be used solely for securing revenue for the legitimate functions of Government?

Do you favor Government competition with private business?

Do you believe that Government operations should be placed on a comparable accounting basis, particularly where the Government competes with private business?

Do you believe in creating by law, through such measures as compulsory unemployment insurance, old age pensions, etc., a private right to publicly controlled funds, thus reducing the efforts of individuals to provide for themselves and increasing their willingness to rely on the Government for support, thereby aggravating the very evils which such legislation is intended to relieve?

Continuous Advertising Aids Motor Improvements

Continuous and increasing use of advertising space in trade journals and daily newspapers is largely credited with the increased volume of business of the Motor Improvements, Inc., by John Graham, president of the company. Mr. Graham reports that his organization has had the most successful year since 1923.

"Much of the credit for our remarkable showing must go to our dealer organization all over the United States," Mr. Graham stated. "But back of all this there has been a steady campaign of advertising backed by a directorate which courageously authorized the use of more and more space in newspapers and trade journals. We are capitalizing this year on this faith of a year ago, and I don't know a better recipe for success than to keep up your courage and your advertising with it."

Declaration of Policies on Vital Problems Urged on Administration

A football coach asked to prepare a team for a hard schedule without being informed as to the rules under which the games would be played, would be in a tough spot. And so is American business, the U. S. Chamber of Commerce pointed out this week, due to apprehensions and uncertainty regarding the administration's policy on vital economic questions.

Declaring that it would do much for the restoration of confidence and the promotion of the general welfare, the Chamber directorate urged the President to make a definite statement as to administration policy on the following subjects:

1—When and how is it proposed to balance the federal budget?

2—Is it the intention of the Administration further to reduce the value of

the dollar; if so, then to what figure and what shall be the content of the dollar so reduced?

3—Will the Administration at the earliest opportune moment collaborate with the other nations in an effort to agree upon a plan for the international stabilization of exchange?

4—Will the efforts of the Administration be directed toward recovery by the encouragement of business initiative, with a minimum of government interference and control and will it discontinue its activities in competition with private enterprise?

5—What is the Administration's policy toward agriculture?

6—Is it the policy of the Administration to continue the construction and development of public works not now needed?

Automotive Orders Aid Steel Pickup

**Price Situation Clouded
by Withdrawal of Cuts
After Filing With Code**

As the result of the withdrawal of several price reductions shortly after they had been filed with the Code Authority and before their going into effect, the price outlook in the steel market has become more obscure. What prompted cancellation of these price cuts puzzles the market. In one case a mid-Western steel company is reported to have filed a \$2.25 per ton reduction in the price of foundry iron. Cold-rolled strip was another item mentioned in connection with these downward revisions that were so speedily annulled.

These developments are reported to have prompted a number of buyers to withhold sizeable business until a more settled state of affairs is discernible. In spite of this, however, the rate of operations in the steel industry made further gains this week, the American Iron and Steel Institute reporting another rise of approximately 10 per cent in employed ingot capacity.

Finishing mill operations are running slightly ahead of those in primary divisions, especially so in the Mahoning and Shenango valley and Chicago districts, moderate tonnage orders from motor car manufacturers and parts makers being chiefly responsible for this.

It has recently been stated that if present plans are carried out annual rolling and finishing capacity of the steel industry would be increased by 5,000,000 tons this year, while no additions can be made under prevailing regulations to furnace capacity. What the effect of this disparity on finished steel prices will be remains to be seen. It must be borne in mind, however, that at least part of the extension of finishing capacity is by way of catching up with the enhanced demand for steel in highly finished forms, chiefly so from the automotive industries, while primary capacity, adequate as it was for an output of 55,000,000 tons in 1929, is hardly likely to be taxed to the limit for some years to come.

Pig Iron—While there are rumors of negotiations covering large tonnages, actual business in nearly all the markets consists of single car lots. Numerous buyers are expecting lower prices, but so far there has been no official announcement indicating that such changes are to come.

Aluminum—Quiet and unchanged.

Copper—A meeting of producers, scheduled for Tuesday, was postponed until Thursday. Curtailment of mine output, to avoid further accumulation of stocks, is generally believed to be the objective, but in some quarters this is denied, and the purpose of the meeting explained as being preliminary to the convening of an international conference of copper producers. In terms of gold, the world price of copper is not much over 4 cents, a low for all time.

The "Blue Eagle" quotation continues at 9 cents, delivered Connecticut point.

Tin—Quiet, with spot Straits quoted at 51.60 cents at the beginning of the week.

Lead—Easy and quiet.

Zinc—Dull.

Fatigue Tests Results Revealed by Dodge Bros.

Dodge Brothers revealed this week that for the past six months it has been financing research on driving fatigue under the supervision of Dr. Andrew J. Ryan, Chicago psychologist. Preliminary data revealed by Dr. Ryan have reached a point where correlation of the actual test data is now possible with elimination of human variables.

The work is to be continued from this point in actual research on individual causes of fatigue. The preliminary investigation, however, indicated tremendous differentials in the fatigue producing qualities of different makes of 1934 cars. Test results will be made available to the industry as they are obtained, according to Dodge officials.

Details as to preliminary findings will appear in these columns next week.

Battery Convention

The tenth annual fall convention of the National Battery Manufacturers Association will be held Oct. 24 and 25 in Chicago at the Hotel Sherman. During the convention the code authority for the industry will meet in order that all important developments may be reported to the members, and to consider any matters referred to it by the convention.

NLRB Would Strip Guide Lamp of Eagle

**May Ask Justice Dept.
To Take Case To Court
As in Houde Corp. Case**

The National Labor Relations Board has recommended that the Compliance Division of NRA remove the Blue Eagle of the Guide Lamp Co., General Motors subsidiary. The board took this action, as it did in the Houde case, when it failed to receive notification from Guide that the company would abide by the majority representation rule within the 10-day period allowed by the Board.

It is assumed in Washington that the Board also will ask that the Department of Justice take the case to court as in the Houde case. NLRB denied a report that it had been notified by the Guide employees association that it would not recognize the representatives selected by the majority.

New Regional Board Set-Up NLRB's Plan

**Propose Paid Directors,
Small Panels to Hear
Cases in Latest Report**

Expedition and economy of handling labor complaints which come before it is sought in the proposals made in the National Labor Relations Board's latest report to President Roosevelt. The board plans to make a more permanent organization of the 19 existing regional boards by centralizing the responsibility for the functioning of each board in a full-time, paid director, engaged by the NLRB and working under the national body's guidance.

Key points are to be established in each of the districts served by the individual boards, and it is proposed to have cases heard at these points rather than centralized in a single city as heretofore. At the same time the NLRB plans to have small panels, probably consisting of one representative of industry, one for labor and one impartial member, selected from the larger regional group to hear the cases.

The board also recommends a limitation on the number of industries to have labor boards of their own with statutory powers such as the steel industry has, and as is suggested by the Winant Committee for the textile industry. At the present time many industrial groups have individual labor boards but without statutory powers. Such an agency is the Automobile Labor Board headed by Dr. Leo Wolman. In this connection the board suggests that no such boards be set up except where the workers are substantially organized in unions and where the industry is not of a far-flung geographical nature, thus requiring expensive regional machinery for hearing complaints.

It is further reported that the NLRB and NRA have reached a working agreement which will end the delays heretofore involved in withdrawing the Blue Eagle from employers charged with violating NRA labor provisions. The board believes it has the right to order the withdrawal of the insignia, but there never has been any assurance that the NRA Compliance Division would carry the order into execution within a reasonable time. The new system is expected to remove the possibility of such delays.

E. W. Lawrence Transferred

The Norma-Hoffmann Bearings Corporation of Stamford, Conn., announces the appointment of E. W. Lawrence as its Southern representative. He has for the past 11 years been connected with the New York sales office.

A.S.T.M. Making Corrosion Tests

Committee D-2 Seeks Recommendation for Standard Procedure

In the hope that a standardized procedure may be recommended, various corrosion tests for lubricating oils are being studied by Committee D-2 of the American Society for Testing Materials, on Petroleum Products and Lubricants. The same committee also has several other projects under way, including methods for determining the softening point of greases and for the consistency of soft greases which are being drafted.

The sub-committee on viscosity is continuing its study of methods of expressing viscosity-temperature relationships, and will attempt to develop a method of determining the viscosities of lubricating oil at 0° F. and also a method for determining true viscosity of certain plastic and semiplastic oils.

In cooperation with the National Association of Lubricating Manufacturers and the Society of Automotive Engineers, Committee D-2 is working to develop a classification for automotive greases.

The sub-group on gasoline is active in developing a standard method of testing gum stability of gasoline. Various accelerated oxidation tests have been studied and comparative data obtained from several cooperating laboratories. Based on this, the committee is developing an improved design of apparatus. The development of a uniform bomb test apparatus is a necessary step toward the study of the significance of oxidation test as regards storage.

Arrest Two Charged With Burglarizing Willys Home

A double arrest by the New York police this week revealed that the Bronx home of John N. Willys was burglarized recently and clothing, silverware and jewelry valued at \$10,000 stolen. Mr. and Mrs. Willys are in Europe on their wedding trip and the charges against the alleged burglars will be heard on their return.

Brother Agency Accounts

It is reported on reliable authority that D. P. Brother Associates, newly formed advertising agency which has obtained the Oldsmobile account, has also secured the account of the AC Spark Plug Company and in addition will handle a General Motor institutional campaign. Mr. Brother, the head of the new agency, was formerly connected with General Motors.



E. J. Goodbold

Whose appointment as production supervisor of the Reo Motor Car Co. has been announced by Ray A. DeVlieg, Reo Works manager. Previously Mr. Goodbold was connected with the Chrysler Corp. for more than 10 years

MEWA Directors Get "BUYmanship" Plans

Objectives of Program Revealed But Details Are Withheld by Assn.

The recent report of a committee appointed last June by the board of directors of the MEWA to study the "BUYmanship" operations of automotive wholesalers, is discussed vaguely in the current issue of the MEWA Times.

The Times says the report "embraces consideration of the nature and extent of competition in price with which members of the trade are faced, it stresses the incontrovertible fact that one must buy right in order that he may sell right, it emphasizes that quality merchandise must at all times be carefully guarded and it makes definite proposal for consideration and action by the Board in formulating suggestions to members. . . ."

"It is important that there be no confusion as between quality and second-rate merchandise in any buying plans. . . . Different methods must be devised to meet the competition of inferior goods than those required to meet competition on merchandise identical with, or of equal quality to, that sold by jobbers when such merchandise is sold by competitive channels on a distinctly lower price basis."

The MEWA says it is now centering attention on this phase of the problem "for the facts would seem to prove conclusively that the jobber is paying for many products a price believed to be unduly in excess of that paid for the identical merchandise by his competitors."

Upon the proper solution of the problems which this condition entails, the MEWA holds, depends to a large extent the welfare of jobbers and manufacturers depending upon them. The plan developed in the report to the directors is said to be dedicated to the solution of this problem. What the plan is—group buying or some other alternative—the Times does not reveal.

MEMA Releases Warehouse Study

Opinions Vary on Matter of Inserting Suck Link in Automotive Distribution

Manufacturing attitude toward warehousing is summarized in a report issued recently by the Motor and Equipment Manufacturers Association on a survey it made among its members.

The report develops sharp differences as to the desirability of inserting a warehouse link in the chain of automotive distribution with the preponderance of opinion among those replying apparently being against the practice. However, it appears from many of the replies quoted that a manufacturer's attitude is determined largely by whether his individual marketing and competitive problems dictate the use of warehouses, which is as might be expected.

In general, the survey indicates that accessory manufacturers are but little concerned with the problem as the need for warehouses in the distribution of their goods has not arisen. Chemical manufacturers appear to be divided on the issue. Shop equipment manufacturers apparently feel that warehouses should be used with discretion if at all. Parts makers evidenced sharp differences of opinion with individual conditions controlling their attitude to a large extent. Tool manufacturers appear to be "agin" warehouse.

Among the reasons cited for using warehousing were small jobber stocks, availability and competition, especially the competition in the home town of competitive manufacturers. Against warehousing, it was argued that it increases the number of small jobbers, tends to reduce jobber stocks and to increase the number of small orders, adds expense and, in the case of shop equipment, makes its easy for jobbers to sell any line.

Harris With Burton

Sid G. Harris, chairman of the Metropolitan Section, S.A.E., is now eastern branch manager for Burton Auto Spring Corp. of Chicago. Mr. Harris is located at the eastern branch and warehouse of the company in Brooklyn. Prior to joining the Burton organization, Mr. Harris was for many years eastern manager of Continental Motors Corp.

"Joe" Delaney Injured

Joseph F. Delaney, assistant deputy administrator of NRA on automotive codes, and his wife were painfully injured in an automobile accident last Saturday. The accident occurred near Burlington, N. J.

The Horizons of E

THE layman reading Francis J. Gorman's order to his battle-scarred picketers to return to their jobs—if they are still there—is overwhelmed. He notes the tribute to the heroism of devoted and courageous followers, the politic praise of an astute leader. Acclaim for the wisdom of the Winant Board is likewise a tactful gesture. The item that causes him to refer back hastily to the earlier accounts of the strike, the truculent manifestos of the leaders, and their uncompromising demand for concessions, is the statement that the Winant Board findings are a "complete victory" for the strikers.

The Greatest "Triumph" in Labor History

From the order of the exultant strike chairman asking the textile cohorts to return to work we extract the following passages:

"Our triumph is one of the greatest in all labor history and your officers salute you and congratulate you. . . . It is our unanimous view, which we shall support by our further statements, that the union has won an overwhelming victory, that we ought to terminate the strike as no longer necessary and that we now go forth in a triumphant campaign of organization. . . . It is necessary to study the Winant Board's report with some care to see how far-reaching it is. It begins with a history of the cotton textile code and the strike, and the report of this official board backs up and justifies everything the textile workers have said about the textile management . . . the victory is complete. . . . Therefore, we recommend that the strike be terminated and that the workers return to work Monday morning, Sept. 24."

Before quoting from this remarkable report, it is necessary to define the objectives of the

strike in the order of their importance.

The Objectives of the Strike

1. The United Textile Workers must have the right to speak for all the workers in the industry. This means majority representation for the industry as a whole followed by the closed shop, the check-off and employment and promotion by seniority.
2. Hours of work must be reduced from 40 to 30 per week.
3. Wages must be raised 33 1/3 per cent.
4. The stretch-out must be abolished. This refers to an increase in the number of looms tended by each worker. The grant of this demand would automatically halt the introduction of labor-saving machinery.
5. Wage differentials must be maintained. In an effort to limit expansion of their labor costs, employers reduced salaries and checked the rise of skilled workers' wages. Past experience with minimum wages imposed by law or labor union rule is that they tend to eliminate wage differentials so that the minimum in effect becomes also the maximum.

The Background of the Conflict

Here are some significant background items contributed by the Winant Committee: "Labor conditions in the cotton textile industry have for a number of years been far below those of the average American industry . . . the average wage paid . . . has been . . . at some periods not more than half of the average for all manufacturing industries. Hours of work have been long and condi-

tions of work for other reasons have frequently been bad."

With the adoption of the code "Child labor was, for the first time, completely eliminated from the industry; hours were reduced from an average of fifty-three per week to a maximum of forty; wage rates raised from pre-code levels of \$8 or \$10 per week to a minimum of \$12 and \$13 per week; average earnings increased during the first months of the code by 70 per cent; payrolls and employment in the industry rose rapidly."

Prior to the codes, the United Textile Workers could claim no more than 15,000 to 20,000 members. In May, 1934 the union claimed a membership of 300,000 in the cotton textile industry alone.

When the industry found it necessary in May to curtail operations 25 per cent the U.T.W. threatened a strike. Its demands were essentially the same as those which formed the basis for the strike which has just ended as a "complete victory." General Johnson postponed the strike by assigning the wage, hour, and differential items to his NRA division of Research and Planning. During the summer, this body found that the industry must normally operate at 90 hours per week, that there was "no factual or statistical basis for any general increase in Cotton Textile Code wage rates" that "on the whole the industry had maintained the differentials in accordance with the requirements of the code."

These findings did not prevent a strike which resulted in the loss of 16 lives, the injury of more than 200, the loss of \$15,000,000 to strikers in wages, the loss of additional millions to the employers and serious interruption to recovery.

Here are the findings of another board which has passed upon the same issues.

f Business

by Joseph Stagg Lawrence

Recognition of the U.T.W.

Regarding countrywide recognition of the U.T.W. as the exclusive agency of the workers, the Winant body says "The board feels that . . . an industry-wide collective agreement between the employers as a group and the United Textile Workers is not at this time feasible, and that collective dealing between labor and management in this industry can . . . best be achieved through development on a plant-to-plant basis.

It proposed the creation of a new body known as the Textile Labor Relations Board. A most careful study of the powers of this new body as described in the Winant report fails to indicate how it is to insure peace in this industry in the future. It will have authority to settle a controversy only insofar as the disputants will grant it jurisdiction.

The proposed body with a technical, impartial personnel may be better adapted to the adjudication of minor grievances than a code authority. The latter consists entirely of employers and is therefore judicially incompetent to hear complaints against management.

No Increase in Wages

The organizers of the U.T.W. persuaded the ill-informed workers to abandon their jobs with the assurance that they would enjoy an increase in wages and work but three hours where hitherto they had worked four. The Winant Board restates the wage arguments of the union and of management. The facts adduced by the two parties are in such utter conflict that a jury is necessary to pass upon them. For this purpose the board offers the findings of the NRA Division of Research and Planning, revised to Sept. 4. This body concludes that an increase in wages under present conditions "in default of a nation-

wide recovery in production . . . would involve considerable difficulties." The conclusion is based upon the following facts:

1. Cotton textile wages have increased more rapidly than other wages.
2. The buying power of the average weekly textile pay envelope is equivalent to that of 1929.
3. Any attempt to pass higher wages on to the consumer will curtail output and reduce jobs.
4. The industry as a whole has been operating at "an out-of-pocket cash loss."

The 30-Hour Week

The Winant Board adds that any reduction in the work week at this time would not increase jobs since the demand from consumers is not sufficient to provide employment even for a 30-hour week. Since organized labor questions the integrity of the NRA statistical sleuths, the Winant report proposes:

1. That the Bureau of Labor Statistics "prepare a comprehensive report on actual wages and earnings now prevailing" and
2. That the Federal Trade Commission likewise make a study of the industry's ability to pay higher wages and reduce the hours of work.

The stretch-out is recognized as the source of serious grievances. The findings on this point may be summarized as follows. The stretch-out does not necessarily increase the work load of the worker. There has been a "materially increased use of the stretch-out system" since the adoption of the code. So many conflicting factors must be considered in ascertaining exploitation of the worker that no formula can now be proposed although the Board feels that such a formula may with time and greater

study be evolved. The Board suggests the suspension of all labor-saving installations until Feb. 1, 1935. A body known as a Textile Work Assignments Control Board shall be appointed to hold hearings and determine the precise increase in machinery attendance which may fairly be placed upon the worker.

With regard to wage differentials the board thought the difficulty here was due to a failure to classify workers properly. A change in classification would have the effect of altering the differential which prevailed between the true classification and the code minimum. Here again the solution is study by the Department of Labor to determine and define classifications.

Victory, Where is Thy Badge?

Now let us see how "complete" the victory of labor has been.

1. The pretensions of the U.T.W. to industry-wide representation of the workers for bargaining purposes are rebuffed.
2. There is no increase in wages or reduction of hours except insofar as impartial, competent investigations may subsequently determine that the industry can afford one or both.
3. To the extent that a new installation reduces labor effort the stretch-out may be used.
4. The code guarantee of differentials shall be assured through a careful determination of classifications.

If these conclusions together constitute the greatest triumph "in all labor history" then superlatives take on an entirely new meaning. Without in any way passing upon the merits of the Winant Report in whole or in part, it seems reasonably clear to a detached observer that labor has sustained a crushing defeat, that the report is seized with desperate eagerness as a gratifying eleventh hour face-saving instrument.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

General business activity was well maintained last week. Both wholesale and retail business continued to improve. A good showing was made by several industries, including automobile, steel, and bituminous coal production. There was an increase in railway freight loadings, but production of electricity in declining reflected the shutdown of textile mills as a result of the strike.

Guaranty's Index

The Guaranty Trust Company's index of business activity for August stood at the preliminary figure of 66.2, as against 66.3 for the preceding month and 74.3 a year ago. The company's index of wholesale commodity prices on Sept. 15 was 52.4, as against 53.2 a month earlier and 51.0 a year earlier.

Car Loadings Gain

Railway freight loadings during the week ended Sept. 15 amounted to 645,986 cars, which marks an increase of 83,256 cars above those during the preceding week, a decline of 14,100 cars below those a year ago, and an increase of 58,740 cars above those two years ago.

Food Prices Rise

Average retail food prices during the two weeks ended Aug. 28, according to the Bureau of Labor Statistics, increased by 3.2 per cent. This rise brings the current index number up to 115.3, as against 111.8 four weeks earlier and 110.4 a year ago. Average retail food prices have risen by 27.5 per cent since April, 1933.

Chain Store Sales Up

Sales of twenty-three store chains and one mail order house during August were 8.7 per cent above those a year ago. Sales of these same companies for the first eight months of this year showed an increase of 15.1 per cent above those in the corresponding period last year.

Current Output Off

Production of electricity by the electric light and power industry in the United States during the week ended Sept. 15 was 1.8 per cent below that in the corresponding period last year.

Life Insurance Gaining

Sales of ordinary life insurance in the United States during August were at about the same level as those during the corresponding month last year. However, sales during the first eight months of this year were about 13 per cent above those in the corresponding period in 1933.

Fisher's Index

Professor Fisher's index of wholesale commodity prices for the week ended Sept. 22 stood at 80.2, as against 79.9 the week before and 80.2 two weeks before.

Federal Reserve Statement

The consolidated statement of the Federal Reserve banks for the week ended Sept. 19 showed a decrease of \$1,000,000 in holdings of discounted bills. Holdings of bills bought in the open market and of government securities remained unchanged.

Propose Extending Murray Bond Maturity 10 Years

A plan to extend the maturity date of the Murray Corp. 6½ per cent bonds outstanding in the amount of \$1,750,000 and due Dec. 31 of this year, has been proposed and a hearing on the proposal has been scheduled by the Michigan Public Trust Commission for Oct. 2 at Detroit. Under the terms of the proposal the maturity date would be set ahead 10 years, to Dec. 31, 1944.

C. W. Avery and C. David Wilson, respectively president and secretary of the Murray Corp. and Walter S. McLucas, president of the National Bank of Detroit, have prepared the plan. It is reported the plan contemplates the depositing a sum equal to 25 per cent of the net earnings of the corporation sub-

sequent to Jan. 1, 1934, in a sinking fund for the purpose of purchase or redemption of the bonds. Beginning in 1937 a minimum of \$125,000 shall be deposited in the fund whether earned or not and no dividends are to be paid on common stock until an average of \$175,000 per year from Jan. 1, 1935, has been so deposited. Bondholders are given the privilege of converting their bonds into stock of the company.

Open Grigsby-Grunow Liquidation Sale Oct. 1

Assets of the Grigsby-Grunow Company, Inc., one of the largest manufacturers of radios, radio tubes and electric refrigerators will be liquidated at public and/or private sale beginning October 1

by the referee in bankruptcy, Frank M. McKey.

Machinery in the Chicago plant of the company consists of the finest makes of all types of metalworking and wood-working equipment; a completely equipped tube plant, enameling plant, and plating plant, all of which are said to be in immediate operating condition. The inventory consists of made-up parts, parts in process, and raw material for radios, refrigerators and radio tubes. The service departments on all three items have been kept intact. Real estate of the defunct company consists of factory buildings with a floor area of approximately 950,000 square feet, and are suitable for almost any type of manufacturing.

The trustee is authorized, under order of the United States District Court, to sell at public or private sale, and is now prepared to receive offers for any part or parcels of the assets. Full opportunity to inspect the assets will be given all prospective buyers.

NLRB Will Hale Houde Into Court

(Continued from Page 365)

The NRA, through its Compliance Division, has informed the Houde Engineering Corporation that it is "not disposed to make an issue" over the Buffalo concern's refusal to surrender its code card and other Blue Eagle insignia as ordered by General Johnson. Surrender of the NRA insignia was ordered when Houde refused to abide by the ruling NLRB majority representation.

Last week the Houde company took the position that it derived its Blue Eagle from the APEM code authority and that APEM could find no violation of the code or other applicable NRA provisions. At the same time Houde informed NRA that it was not in any manner displaying or making use of the Eagle or other NRA paraphernalia.

NRA's reply to this was the letter in which the "no issue" clause appeared and which went on to inform Houde that the Blue Eagle is the property of the United States Government, is protected by United States Design Patent No. 907793½, and issued in connection with the President's Reemployment Agreement. While NRA took the position that it would make no issue of the case as long as Houde did not display a code card or Eagle it also said that should Houde at any time display or use the Blue Eagle "the administration will necessarily institute proceedings against you for illegal display and use."

Experiments Fitting US To Meet Rubber Needs If Curtailment Plan Jumps Price

If the price of raw rubber should ever be forced as high again as in 1923-27 under the Stevenson Plan, the United States will be in a fair position to produce a good share of its rubber requirements, the Department of Agriculture says.

Experiments by the department covering practically every important plant used for commercial production of rubber throughout the world have singled out as the most promising sources for domestic rubber goldenrod, guayule, a shrub which grows well in the Southwest, and Hevea, the rubber tree of the tropics. Of these, goldenrod is regarded as the most likely to develop commercially. The transfer to the department recently of the Edison collection of goldenrod selections has given new impetus to the research program.

Rubber of good quality has been made from goldenrod, but the details of extraction and manufacture have not been developed sufficiently to produce rubber on a commercial scale. With present knowledge it would not be possible to make rubber from goldenrod at prevailing prices of about 15 cents a pound. However, experiments now in progress in the department lay the foundation for domestic rubber production in case of an emergency.

Guayule is a shrub native to Mexico and southern Texas which resembles sage brush and which can be harvested with machinery. Several thousand acres have been planted to guayule in California by a company interested in its development.

For maximum yields, guayule is harvested only every fourth year, thus it would be necessary for farmers to have some assurance of a stabilized price before this crop would be grown on a large scale. Because the whole plant is harvested it is necessary to have a large area and a succession of plantings to insure a continuous harvest. It is a long-time, large-scale rotation.

Other sources of rubber which could be developed in this country if the price were high enough to warrant it include the Hevea, the famous rubber tree of the tropics. The department now has 30,000 of these trees growing in Florida, some of them from seed produced there. There is every reason to believe that they will yield as well as those in the East Indies.

Another rubber tree which grows well in Florida is the Castilla, from Central America. It is not so resistant to frost as Hevea, but it has a big advantage in that it yields a large percentage of its rubber at one tapping, a factor that would help to cut labor costs.

Rubber made from guayule and goldenrod in this country so far has not been so good as the imported product. With continued improvement in methods of extraction, however, it is entirely possible that domestic rubber from these plants might be made to approximate that from the East Indies, in

the opinion of L. G. Polhamus, who for several years has been engaged in a study of rubber plants for the Department of Agriculture.

Ford Sunday Broadcasts

Edsel B. Ford has announced a new series of Sunday evening broadcasts over the Columbia coast-to-coast network beginning Oct. 7 and continuing through the fall and winter. These programs will feature the Ford Symphony Orchestra, conducted by Victor Kolar, and a notable array of guest stars.

Welding, Cutting Display

Developments in the fields of oxy-acetylene welding and cutting, hard-surfacing, ferroalloys and alloy steels will be displayed and demonstrated by three units of Union Carbide and Carbon Corporation at the National Metal Exposition, Oct. 1 to 5, Port Authority Building, New York City.

Graham-Paige Financial Position Strengthened

Graham Paige shows an improved current position in its June 30, 1934, balance sheet recently released. As a result working capital was up from \$895,570 to \$1,375,144. The improvement was due largely to increases in receivables and inventories, as cash declined. A \$100,000 notes payable item also appears among the liabilities. As previ-

ously reported, the company earned \$20,005 in the first half against \$23,627 in the same period last year.

A summary of current assets and current liabilities follows:

| | June 30, 1934 | Dec. 31, 1933 |
|-------------------------------------|--------------------|--------------------|
| Current Assets | | |
| Cash | \$576,938 | \$707,123 |
| Accounts & Notes Rec. (Net) | 525,497 | 96,122 |
| Other Accounts & Notes | 48,628 | 35,835 |
| Inventories | 1,348,300 | 1,051,724 |
| Total | \$2,499,364 | \$1,890,806 |
| Current Liabilities | | |
| Notes payable | \$100,000 | |
| Oblig. to Finance Co. | 27,980 | 10,918 |
| Accounts payable | 449,169 | 461,161 |
| Dealer and Customer cred. bal. | 120,552 | 74,820 |
| Accrd. Payrl., tax, etc. | 203,914 | 234,120 |
| Funded debt due | 65,000 | 103,000 |
| Land contracts due | 32,000 | 70,000 |
| Operating reserves | 125,605 | 41,216 |
| Total | \$1,124,220 | \$995,236 |

Walter Boynton

Walter Boynton, automotive publicity man and music critic, died suddenly last Sunday in a Washington hotel. He was 58 years of age. Mr. Boynton was the son of Albert G. Boynton who moved to Detroit from Bangor, Me., shortly before the Civil War and became editor and co-owner of the Detroit *Free Press*.

After graduating from University of Michigan Mr. Boynton joined the *Free Press* staff, later becoming music critic of the paper. Leaving newspaper work he became head of the Detroit publicity offices of General Motors, resigning this post to become Detroit editor of *Automotive Daily News*, later he joined the C. C. Winingham Agency as a vice-president. Two years ago Mr. Boynton became associated with the publicity department of the Campbell-Ewald Co.

CALENDAR OF COMING EVENTS

SHOWS

Cleveland (Automotive Service Industries) Nov. 19-23
New York Automobile Show Jan. 5-12
Chicago Automobile Show Jan. 26-Feb. 2
Automobile Merchants Assoc. of N. Y., Automobile Show Jan. 5-12, 1935
Washington Automotive Assoc., Automobile Show Jan. 12-19, 1935

MEETINGS

American Chemical Society, Cleveland, Ohio Sept. 10-14
American Welding Society, New York, City Oct. 1-5
Natl. Aeronautic Association Meeting, Washington, D. C. Oct. 11-13
American Trucking Association, Chicago Oct. 22-24

ANNUAL MEETINGS

Natl. Safety Council, Cleveland, O. Oct. 1-5
Institute of Traffic Engineers, Cleveland Oct. 2-3
S.A.E. Annual Production Meeting Detroit Oct. 10-11

CONVENTIONS

American Society for Metals, New York City Oct. 1-5
American Transit Assoc., Cleveland Sept. 24-27
Natl. Wholesale Hardware Assoc. Annual Convention—Atlantic City, Oct. 22-25
International Foundry Congress, Philadelphia Oct. 22-26
American Foundrymen's Assoc., Philadelphia Oct. 22-26
Motor & Equip. Wholesalers Assoc. Annual Convention—Cleveland, O. Nov. 16-17
National Foreign Trade Council, New York Oct. 31-Nov. 2

EXPOSITION

Natl. Exposition of Power & Mechanical Engineering (Biennial) New York, N. Y. Dec. 3-8

FOREIGN SHOWS

Paris Automobile Salon Oct. 4-14
London International Automobile Show Oct. 11-20
International Aeronautic Exposition, Paris, France Nov. 16-Dec. 2

Does the Parts Industry Need It

Plan to create bi-partisan regional agencies with neutral federal chairman being studied by leading parts manufacturers

by A. F. Denham

Detroit Editor,
Automotive Industries

WHO has jurisdiction, or who should have jurisdiction, in the case of labor disputes involving members of the automotive parts and equipment manufacturing industry? That question has once more come to the forefront as the result of decisions of the National Labor Relations Board in the Houde Engineering and Guide Lamp cases—decisions contrary to rulings by General Johnson and Donald Richberg, and as a matter of fact contrary to President Roosevelt's own interpretation of labor representation for purposes of collective bargaining.

Briefly, the history of the problem has been:

1. The President's settlement of the automobile manufacturing plant strike threat, setting up the Automobile Labor Board under Doctor Wolman to handle labor disputes, and ruling for proportionate representation of employees in any given plant.

2. Executive order No. 26 by General Johnson authorizing the Automobile Labor Board to hear cases involving parts or equipment manufacturers if both sides are willing to accept that Board's jurisdiction.

3. Statements by General Johnson and Donald Richberg, upholding the interpretation of collective bargaining as calling for proportionate representation for all employees.

4. Opposition to this attitude on the part of the A.F. of L., the National Labor Board and its successor the National Labor Relations Board, in deciding in favor of majority rule.

5. Orders by the NLRB to Houde Engineering Corporation and Guide Lamp Corporation (subsidiary of General Motors Corp.) to recognize the A.F. of L. as representing its employees—since elections held in these plants resulted in A.F. of L. representatives polling a majority of votes.

6. Refusal of Houde Engineering to accede to that ruling.

7. Communication from General Johnson to Houde Engineering requesting return of NRA insignia, based on NLRB (not NRA) ruling, and refusal on part of Houde Engineering, who point out that they are responsible to APEM code authority, which authority holds that they have not violated the NRA. A subsequent

letter to Houde from NRA asserts that the Blue Eagle is subject to the exclusive control of NRA.

8. Bulletin by National Manufacturers Association to members advising them against accepting majority ruling of NLRB.

9. Reported communication to Washington from employees of Guide Lamp Corporation not members of A.F. of L. that they will not be guided by NLRB decision requiring Guide Lamp to recognize majority rule of A.F. of L.

There the matter stands. To all appearances, unless the Federal administration refuses to back up the NLRB, or the latter board reverses its decision, the cases will go to the United States Supreme Court eventually. It is doubtful, however, whether the administration desires a test of its powers in this direction at this time.

Facing the problem that further cases of similar nature will come to the same termination, in the case of the automotive parts industry, the problem arises as to how to forestall further developments along this line in other plants.

Today there is no way in which labor and management in the parts industry can get together outside of employee representation plans.

The A.F. of L., on principle, will not accept the jurisdiction of the Automobile Labor Board over parts and equipment manufacturers' employees. These manufacturers on the other hand will not accept the jurisdiction of Regional Labor Boards, which in turn come under the NLRB.

The reason for this is largely that

manufacturers consider the boards stacked against them. Manufacturing representatives named to these boards are members, as far as actual practice goes, in name only. Such men as Walter P. Chrysler, nominally on the Detroit Regional Board, are rarely in Detroit and certainly are not able to give their time to the hearing of a multitude of minor cases, most of which bear no relation whatsoever to their own industry.

Although opinion is far from unanimous, there has been for a long time quite a number of leading parts makers in favor of a special board to handle labor problems in their industry. The first outgrowth of this was the above-mentioned executive order No. 26, authorizing the ALB to hear such cases. A few cases involving parts companies have come before this board, notably the Motor Products Corp. dispute last spring, when the ALB effected a strike settlement, and the Auto-Lite strike case in Toledo, etc.

As a whole, however, few parts manufacturer cases have come before the board, largely due to A.F. of L. objection (the MESA is also opposed to this board).

The question of an entirely separate board has long been looked upon as having decided merit, therefore, not only by many manufacturers, but reputedly also by various officials of the NRA in Washington.

Objectors to the plan, and it has opponents, point to the apparent fact that the parts and equipment industry is scattered over the United States, whereas automobile manu-

Its Own Labor Board?

facturers are fairly well concentrated in the Detroit area.

As a check on this, *Automotive Industries* has made a study of the distribution of manufacturers in this industry both numerically and as to size.

The net results are as follows:

1. About 75 per cent of all manufacturers are located within a 300-mile radius of Detroit. These manufacturers moreover represent a total of over 95 per cent of all employees in the parts and equipment industry.

2. Broken down by States, Michigan, Indiana and Ohio alone cover roughly 50 per cent of all the manufacturers, and probably 80 per cent of all employees in the industry.

3. If to the latter is added the Chicago-Milwaukee district, the total is raised to roughly 70 per cent of all manufacturers, and over 90 per cent of all employees in the industry.

Obviously it would be a difficult problem, mechanically, to set up one board to cover even this limited territory at reasonable expense, but what does seem to be possible is the setting up of localized boards or "jury panels" in different centers of the industry, with one traveling representative from the Federal Administration, with power to call meetings in the various communities.

The set-up would differ materially from that of the Regional Labor Boards. In the first place, the boards or juries would deal with nothing except cases pertaining to the automotive parts and equipment industry. As such, the nomination of members and alternates for both industry and labor would assure complete and balanced representation.

Being of relatively localized interest, boards would have a clearer conception of the problems involved and would be able to deal with them in a saner fashion.

The selection of one administration member to sit with such boards would provide the necessary judicial control.

Automotive Industries' study of the geographical distribution indicates that approximately eight to ten centers of manufacturing would cover the entire area above mentioned, with practically no cases to be heard exceeding 50 to 75 miles

from the center in question.

In other words, the problems of 95 per cent of the employees in the parts and equipment industry could be taken care of, at least better than at present, by setting up "panels" in some eight or ten communities, to meet when called together by the Federal Administrator, to consider problems connected with automotive industrial enterprises in their district.

Obviously much of the success of this scheme of operation would depend on the qualifications of the Federal Administration representative selected for the job. That he must be strictly neutral as concerns labor and industry is, of course, imperative.

No doubt industry and labor alike would probably look askance at any one man selected for this position, as they did in the case of Dr. Leo Wolman of the Automobile Labor Board. Yet Doctor Wolman today has the respect of both labor and industry (irrespective of the political reasons for A. F. of L. objections to the ALB).

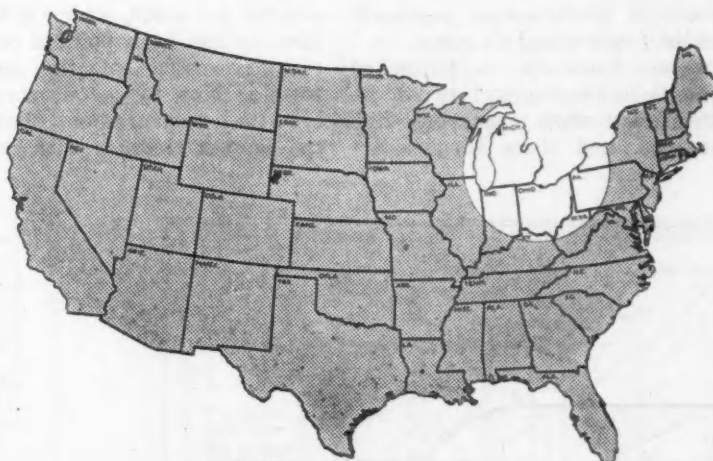
That there must be other men who can be sufficiently unbiased in their viewpoints, and able enough to com-

mand the respect of labor and industry goes without saying. He would prove a boon to the automotive industry not coming under the ALB.

There are, of course, other problems in connection with the scheme, and only time will tell whether they are important or not. Under existing legislation and executive orders, the NLRB is authorized to recommend the creation of additional labor boards to serve particular industries. And it is quite possible that the NLRB might be induced to make such a recommendation, since it recognizes the desirability of settling disputes where they occur rather than in Washington.

In this connection, it should be mentioned, however, that NLRB recommended this week in its second report to the President that as a general principle labor boards for individual industries should not be established except where the workers were substantially organized and where the industry was not so far-flung geographically as to require the creation of elaborate and expensive machinery for the handling of complaints. On the basis of the

(Turn to page 392, please)



While there are parts makers in practically every section of the country, 75 per cent of them employing 95 per cent of the industry's workers are located within 300 miles of Detroit

Gyroscopic Torques Not Length Transverse-Link In

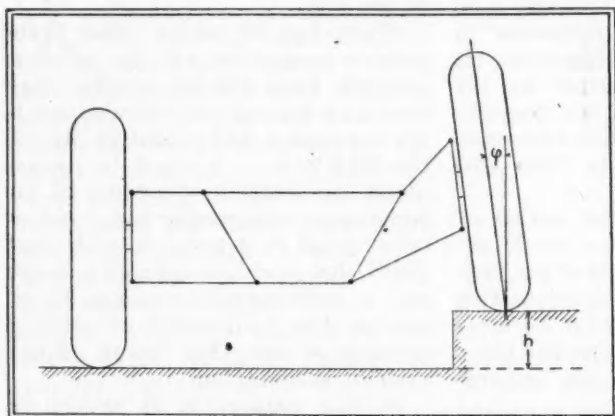


Figure
One

ONE of the main reasons for the introduction of independent suspension of front wheels was the desire, on the part of engineers, to eliminate the gyroscopic torque resulting from the angular movement of the planes of the wheels when passing over an obstacle.

A gyroscopic torque or couple occurs when a rotating body—in our case a rotating wheel—changes the angle of its axis of rotation. This gyroscopic torque was thought to be the underlying cause of the very disagreeable phenomenon popularly known as front-wheel shimmy.

However—contrary to published statements—gyroscopic torques do occur in cars with transverse-link suspensions, and these torques are

not of such small magnitude as to be negligible.

In a design of this sort (Fig. 1) it is impossible to have both the camber and the wheel tread remain constant when the car passes over an obstacle. Usually the designer is forced to make some sacrifice by allowing the tread to vary a little, in order not to be forced to vary the camber too much, which latter variation, as has been pointed out, is the primary cause of the gyroscopic torque. Now for a concrete example.

Actual measurement showed that the camber changes with the height

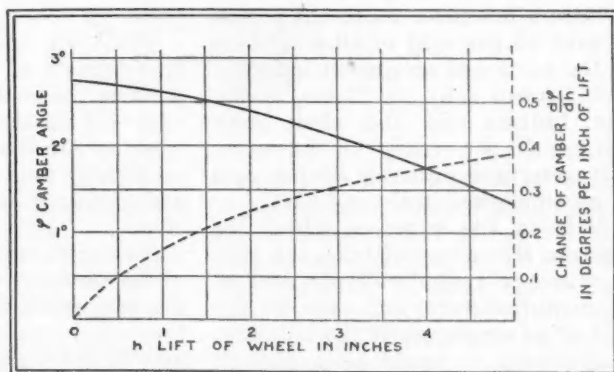


Figure
Two

of lift as given by the solid-line curve of Fig. 2. When the wheel passes over the obstacle its axis describes a certain curve. For the sake of simplicity let us assume that the obstacle is in the form of a square step of a certain height, in which case the wheel axis describes a simple circular path as shown by 0-0₁ in Fig. 3.

On the basis of the above assumption we now trace a family of curves (Fig. 4) of the paths of the wheel axis for a given wheel diameter (32.75 in.) and for obstacles of different heights. These values are plotted against horizontal distances in inches, or, assuming a uniform speed of one inch per second, against time in seconds.

The gyroscopic torque or moment acting on the steering wheels (and producing forces of compression and extension on the steering links) is equal to

$$T = I\omega_1\omega_2$$

where I is the moment of inertia of the rotating body (in our case that of the wheel) in lb-in-sec.²

ω_1 , the rotational velocity of the wheel in radians per second;

ω_2 , the precessional velocity of

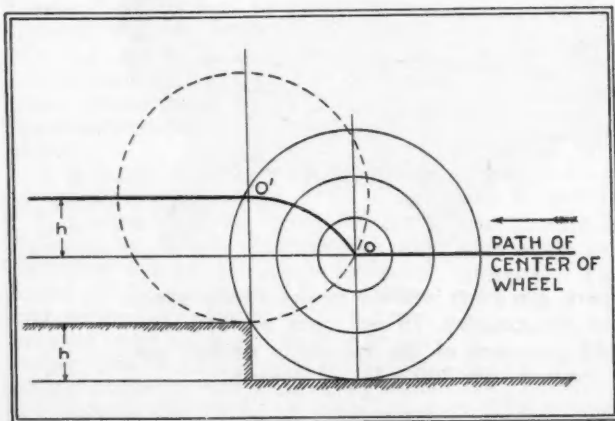


Figure
Three

Negligible in Unequal-Independent Suspensions

by Boris P. Sergayeff,
Math. D.B.S.E.

the wheel in radians per second.

The moment of inertia of the wheel can be readily found by weighing the wheel and swinging it around a knife edge at a certain distance from its axis. The weight of the wheel here under consideration was found to be 96.75 lb., its outside diameter 32.75 in., and its moment of inertia 21.015 lb-in-sec².

The rotational speed of the wheel is

$$\omega_1 = 35.2 (V/D),$$

where V is the speed of the car in m.p.h., and

D , the outside diameter of the wheel (32.75 in.).

I and ω_1 are constant for a given car and a given speed, regardless of the height of the obstacle.

The third factor to be determined, the precessional speed ω_2 , changes while the obstacle is being climbed.

That is to say, the precessional velocity is equal to the product of the change of camber per inch of rise of the wheel, by the rate of rise or the vertical velocity of the wheel while surmounting the obstacle.

Values of $d\phi/dh$ can be found from Fig. 2 for any height of the wheel by differentiating the curve of cam-

ber angle. These values are represented by the dotted line. Values of dh/dt can be found from the family of curves in Fig. 4 for any moment and for any of the paths of the wheel axis. These values are represented by the dotted lines.

Assuming an obstacle of a certain height h_{1max} , we find the value of dh/dt for various values of h_1 from 0 to h_{1max} and the corresponding time from the curve of h_1 . Results of such calculations are plotted in Fig. 5. The values for $I=1$ and $\omega_1=1$ give real criteria of the gyroscopic torques at different points in

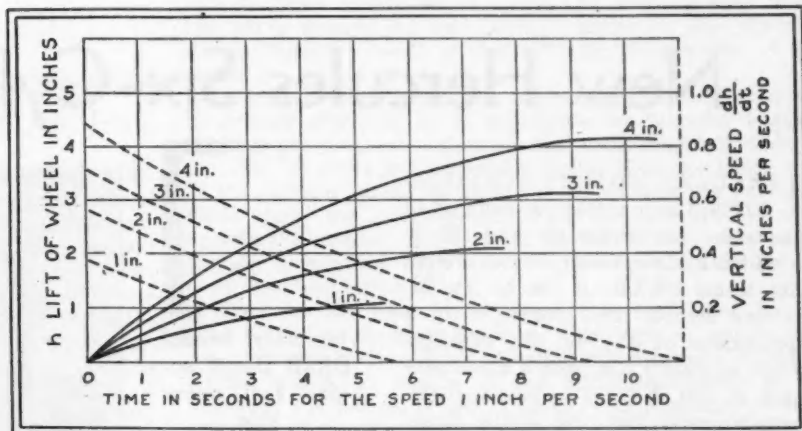


Figure Four

$$\omega_2 = \frac{d\phi}{dt} = \frac{d\phi}{dh} \times \frac{dh}{dt}$$

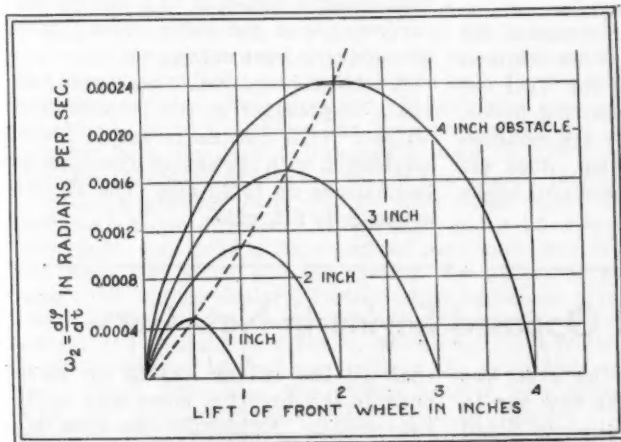


Figure Five

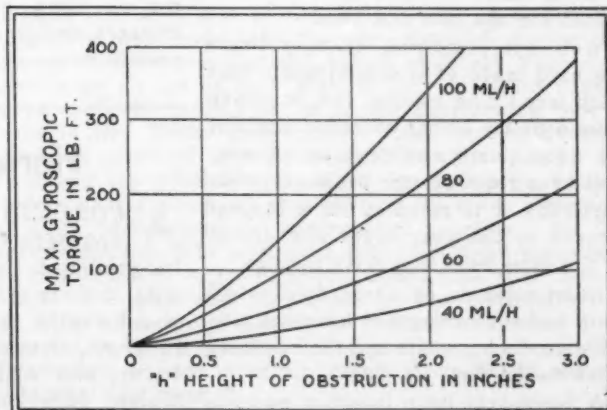


Figure Six

the path of the wheel over the obstacle.

From the curves of Fig. 5 we see that the gyroscopic torque changes constantly from zero to a maximum and back to zero again while the wheel passes over obstacles. At the beginning and at the end of the climb the gyro-torque is equal to zero, and it may be this fact which gave rise to the erroneous impres-

sion that there is no gyro-torque normally.

With the data represented by the various graphs we can readily determine the maximum gyro-torque for any car for any height of obstacle.

$$T = I \omega_1, \omega_2 = \frac{21.015}{12} \times \frac{35.2}{32.75} V \\ \times 17.6 V \times \omega_{2max} = 33.2 \omega_{2max} \\ V, \text{ lb-ft.}$$

where V is the speed of the car in m.p.h. and ω_2 the maximum precessional velocity as obtained from Fig. 5. The results for different car speeds and different heights of obstacle are plotted in Fig. 6.

By this analysis I believe to have shown that the gyroscopic torques resulting in forces on the steering arms and links are not so small as to be negligible.

New Hercules Six-Cylinder Diesel

HERCULES MOTORS CORPORATION, Canton, Ohio, announced in *Automotive Industries* of Aug. 25 it has added a six-cylinder Diesel engine to its Model DRXB, of 4% by 5 1/4 in. bore and stroke. This engine, with a displacement of 474 cu. in., develops 120 hp. at 2000 r.p.m. and a maximum torque of 340 lb-ft. The torque curve is exceptionally flat, the torque dropping only 40 lb-ft. as the speed is increased from 600 to 2200 r.p.m. This engine is interchangeable with Hercules YX and RX gasoline engines.

The engine is a full Diesel of the auxiliary combustion chamber type. Both the crankshaft and camshaft are carried in seven bearings. The crankshaft has 3 in. main bearings and 2 1/2 in. crankpins. The floating piston pin has a diameter of 1 1/2 in. Main and connecting rod bearings are removable steel shells lined with high-lead bronze.

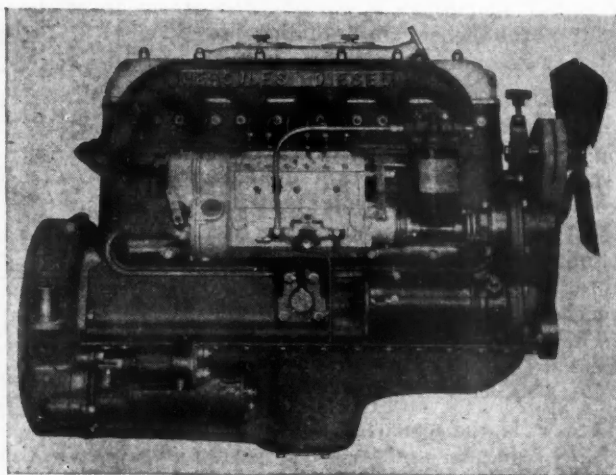
Aluminum alloy pistons are used. Connecting rods are of heat treated chrome-nickel-molybdenum steel and rifle drilled for lubrication of the piston pin. Connecting rod bolts are forged integral with the rods. This feature is said to bring the clamping action closer to the bearing edge than is possible when the rods are drilled and separate bolts are used. Besides, the rod is stronger than when drilled and machined for the bolt and head.

Wet type removable cylinder liners are used made of a centrifugally cast alloy iron. The cooling fan is driven from a pulley on the extended shaft of the water pump, and when an air compressor is required (for brakes or other purposes) it is mounted on a bracket secured to the gear cover and driven by the same belts that drive the fan.

Lubrication is by force feed to all main and connecting rod bearings, piston pins, timing gears and the overhead valve mechanism.

A Bosch-type main injection pump is

Hercules Model DRXB Diesel engine fuel-pump side



used and the engine is designed to accommodate such accessories as a 24-volt generator, 24-volt starting motor, an automatic governor, fuel and lubricating oil filters, air cleaners, a fuel-timing device, and a viscometer unit. These accessories are usually provided by the engine buyer, but they can be supplied by the engine manufacturer when specified.

On the exhaust side are mounted the fuel pump, driven by a silent chain at one-half engine speed; the fuel oil cleaner; generator and starting motor, while on the opposite side are mounted the oil filter, water pump, dual air cleaners, and air compressor (for brake operation).

On this model the crankcase and cylinder block are cast integral of alloy iron. A No. 2 S.A.E. bell housing is standard, while a No. 6 is optional at some additional cost.


In accordance with the usual Hercules practice, this model is also built into complete power units, either fully enclosed or open, as used in oil field service, general industrial applications and for pump and generator drive. It is also converted for marine use.

A self-priming, double scavenging oil pump is provided in the pressed steel oil pan. It is claimed to assure ample lubrication with the engine operating at inclinations up to 45 deg. The oil pan capacity is 2 1/2 gals.

Horizontal Opposed Engine in New Car

ACCORDING to *The Referee*, the Southern Cross, the new car to be produced in Australia, is fitted with a four-cylinder horizontal opposed engine mounted on the frame in front, developing 60 hp. at 3200 r.p.m., and with a torque converter which functions automatically so

that all the driver has to do is to operate the throttle, steer and apply the brakes. Evidently the firm behind this new creation is not content with being the pioneer automobile manufacturer in the antipodes but wants to lead the automobile industry generally.



AUTOMOTIVE ABSTRACTS

Visualization of Air Flow

FOR demonstrating the detailed behavior of small, individual air streams in which the worker in aeronautical fields is frequently most interested, smoke and kindred mediums are not altogether satisfactory even when supplied as a band of parallel jets. What is required in such cases is the visualization of a small, discreet volume of air whose motion can be followed from point to point. On a laboratory scale this has been accomplished very prettily by interposing in the flow an electric spark gap between two fine wires. The passage of a spark heats a tiny spot or ball of air, changing its refractive index so that it can be shown as a dark shadow by transmitted light or photographed for permanent record by the Schlieren system. By an extension of the latter method, a number of heating sparks in series, arranged across the air-stream under investigation, produce a line of hot-air spots which are photographed by other, larger, illuminating sparks, both sparking devices being synchronized so that a cinematograph record can be obtained. The method is a notable example of scientific ingenuity and has already produced numerical data bearing on fairly simple types of flow.

This and other methods of visualizing air flow are discussed in "Methods of Visualizing Air Flow," Report No. 1552 of the Aeronautical Research Committee, H. M. Stationery Office, London (15).

Details of the Precombustion-Chamber Process

THE precombustion-chamber type of engine originated around the turn of the century and in the course of the few years was greatly developed by the firms of Benz & Co. and Deutz. Its object was to avoid the need for the expensive and sensitive air compressor. Injection by compressed air, which up to that time had been universal, was to be imitated in a simple and inexpensive way by utilizing an explosive pressure generated within the engine itself.

Injection phenomena in engines with direct injection involve particular difficulties under three different operating conditions, viz., vehicle acceleration, part load, and idling. The basic difficulties are the greater the wider the speed range. In one particular direct-injection engine, in order to make idling more satisfactory, three of the six cylinders are cut out and then act as a brake, calling for the injection of larger quantities of fuel per cycle in the remaining cylinders. Such difficulties, the author asserts, are unknown with the precombustion-chamber type of engine. Both atomization of the fuel and its dispersion within the combustion chamber proper are practically independent of the quantity injected and of the engine speed. With this type of engine it is unnecessary to devote particular care to the injection process, because atomization is effected partly by turbulence in the precombustion chamber and partly by

the nozzle-shaped orifices of the communicating passage. Adequate injection pressure is supplied by the precombustion chamber regardless of speed and load, because about the same amount of fuel always burns in the chamber whose oxygen content is substantially independent of the speed.

In an engine with indirect injection the atomization can be greatly promoted by so arranging the transfer passage between precombustion chamber and main combustion chamber that its walls get materially hotter than the inner wall of the cylinder head. In that case, as soon as the fuel particles strike the incandescent walls, they are further split up and the smaller particles are heated to their very cores, thereby preparing them for delayless combustion in the main combustion chamber.

Since in this case atomization is accomplished by the precombustion chamber pressure, this type of engine can use the much more reliable so-called pintle-type of injection nozzle, which, by reason of the pintle oscillating in the orifice of the nozzle, is self-cleaning. As a matter of fact, this type of nozzle never suffers from carbonization troubles.

Because of the uniformity of injection pressure regardless of load and speed, this type of engine is much less sensitive to changes in fuel quality, and precombustion-chamber type engines can be run on vegetable oils without change in adjustment.

Summarizing the advantages of the engine-type discussed, the author points out that only with the aid of the precombustion-chamber principle is it possible to equal the classic air-injection Diesel engine with respect to controllability, atomization and dispersion of fuel. The air-injection engine is out of question for vehicle use, for well-known reasons. It is therefore to be expected that in the further development of the high-speed Diesel, the precombustion chamber type will be given more attention, especially in view of the fact that it permits of the use of domestic (German) fuels. A further important advantage of the system is that its use reduces the peak pressures normally occurring in Diesel engines to tolerable values.—K. Schwaiger, *ATZ*, Aug. 25.

Aerodynamic Research

THREE or four years ago, when the variable-density wind tunnel at the National Physical Laboratory at Teddington, England, was in the early stages of design, the suggestion was made that the air exhausted during the process of decompressing the tunnel might be utilized to provide an air jet of very high velocity in which experiments might be carried out at speeds approaching that of sound in air. Under such extreme conditions the dynamic pressures produced by the interposition of a body in the air stream are sufficient to compress the air locally and thus produce effects which are negligible at the lower air speeds normally encountered in aeronautical practice. An immediate problem is in connection with high-speed propellers, the tips of which rotate at speeds comparable with that of sound. The suggested high-speed jet has materialized in the form of a tunnel having a working section of 1 ft. diameter, in which compressibility problems can be studied with models exposed in an air stream above 850 ft. per sec.—*Engineering*, Sept. 7.

While the general design of the high-speed, four-cycle oil engine follows that of the modern gasoline engine intended for the same service, the design of its combustion chamber is essentially different. The number of distinct types of combustion chambers to be found in production models tends, even now, to increase, although the specifications of performance are, to all intents, identical in any one field.

In this article, a classification is made of the various combustion-chamber types now in use, while the theory of their working is discussed in detail. Having compared their performance, insofar as this can be expressed in exact terms, an attempt is made to assess their relative economic usefulness.

IN the development of the oil engine there is no single factor of greater importance than the design of the combustion chamber. It is upon this one small but vitally important part that all the essential features of power output, fuel consumption, and road performance must depend. In the layout of the remaining parts of the engine, the designer may well be guided by current gasoline-engine practice, introducing suitable reinforcement to deal with the greatly increased maximum pressures and torque variations of the oil-engine cycle. In the arrangement of the auxiliaries, also, there is no need to depart greatly from established practice. In the design of the combustion chamber, however, a satisfactory performance can only be had as a result of experimental development, and existing designs are not of much assistance.

It is the purpose of this article to consider this one aspect of high-speed oil-engine design and to coordinate and present some of the evidence which has accumulated during the past ten years. The subject has been approached strictly from the point of view of the automotive engineer, interested in engines developing from 15 to 20 hp. per cylinder and having a displacement of some 500 cu. in. No attempt has been made to prove the definite superiority of one particular type, the chief requirement being a familiar one, commercial success; demanding, in brief, maximum performance per dollar.

It is hardly necessary to point out that it is impossible to consider the combustion chamber apart from the injection system with which it is associated. The discussion is much simplified, however, by the fact that at the

Combustion Chamber Design Speed Compression-Ignition

present time, one type of fuel pump is to all intents standard, while the design of the injection pipes with which it is fitted does not vary greatly in high-speed engines. It must be clearly understood, however, that, should another system become available, one capable of maintaining a closer control over the injection, such as the "common-rail" system, or of better distribution of the fuel spray, as was the case with air injection, there would be very little to be said in favor of the more complicated types of combustion chambers.

Again, the performance of any given chamber is closely bound up with the type of fuel it is intended to burn. If we are to work with more refined domestic fuels, no particular problem arises, but, if we are to design engines for those remote places where they are already so much in demand, the "dainty feeder" will not do. This is too big a problem for treatment in detail here, and it will only be possible to indicate the characteristics of the various chambers from this point of view.

Having thus summarily dismissed the important factors of the injection pump and the fuel, it remains to discuss the shape of the combustion chamber and the provision to be made for air movement, the design of the nozzle and its position in the chamber, the effect of compression ratio on noise and starting ability, and the result of all these factors in terms of performance. Finally, it will only be possible barely to mention such vitally important points as maintenance costs, effects of

super-charging and the future requirements of the two-stroke cycle and air cooling.

It will first be necessary to classify the various types of combustion chambers now in current use in high-speed engines. Such a classification must, of course, be somewhat arbitrary, and the various combinations are now so numerous that it will occasionally be difficult to decide upon the group in which a given type should be placed. The simplest arrangement seems to be—

1. Direct-injection, in which the mixing of the fuel is carried out primarily by—
 - (a) swirling air movement or,
 - (b) fuel movement plus air turbulence.
2. Ante-chamber injection, the mixing carried out primarily by—
 - (a) swirling air movement or,
 - (b) extremely turbulent air movement.

An air cell may be associated with any of the above types.

Direct injection may be defined as the injection of the fuel into an "open" chamber, one side of which is complete-

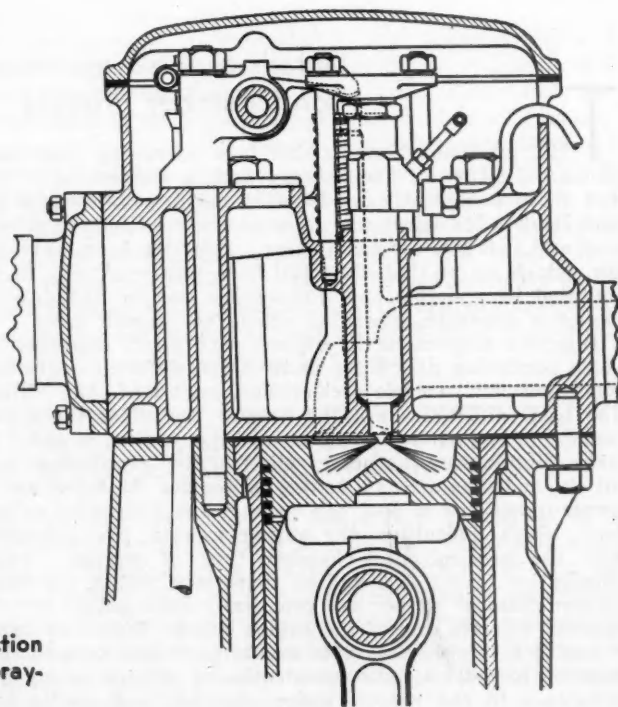


Fig. 1—Direct-injection Chamber, Central Spray-type

Design in High Ignition Engines

A critical appraisal and comparison of the various types in current use

by Percival Biggar

Chief Designer, Leyland Motors, Ltd.,
London, England

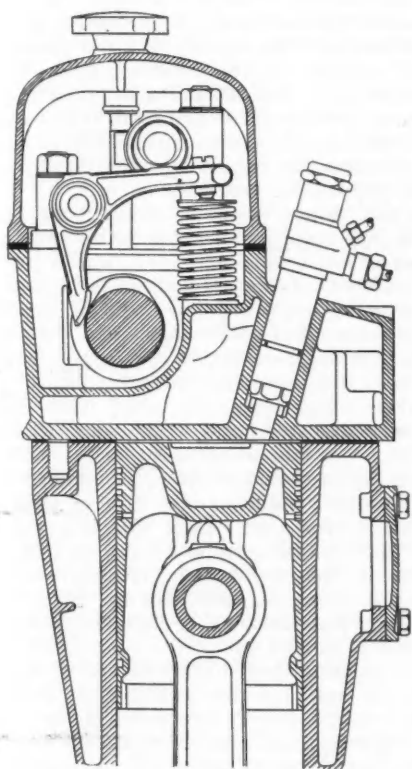


Fig. 2—Direct-injection Chamber, Offset Sprayer Type

ly formed by the engine piston. Chambers of this type (see Figs. 1 and 2) are characterized by simplicity and compactness, which leads to a favorable surface-to-volume ratio, not only with the piston at its top center but also as it descends on the expansion stroke.

Swirling air movement is obtained by conserving and directing the momentum of the inflowing air by shaping the inlet valve or port, or both, so as to promote a steady rotation of the air charge about the axis of the cylinder. As the valves are invariably placed overhead in chambers of this type, there is nothing to damp rotation and the swirl persists, practically undiminished, throughout the compression stroke. The fuel is injected at right angles to the direction of the air movement.

Turbulent air movement results when the air is admitted without any special directional control. A certain amount of swirl ensues, but the chief

result is one of general disorder and the onus of mixing is placed primarily upon the injection system. Fig. 3 shows a combustion chamber of this type in which the fuel is injected horizontally through a number of jets.

Ante-chamber injection may be defined as the injection of the fuel into a "closed" chamber which is separated from the cylinder and is connected thereto by means of a more or less restricted throat. The restriction may be imposed temporarily by the entry of a nob on the piston into an otherwise open cell. The required air movement is caused by forcing all—or at any rate a substantial part—of the air charge through this throat as the piston ascends during the compression stroke. Clearly, it is possible to create an almost unlimited velocity of air transfer into the ante-chamber, though at the loss of some compactness and an increase of surface-to-volume ratio which becomes more serious in view of the exceedingly high rate of heat transfer from the flame to the walls of the throat at the beginning of the expansion stroke (see Figs. 4 and 5). If we may call the mixing of the first type of direct-injection chamber the coffee-cup method, then that of the ante-chamber must be described as the cocktail-shaker system.

Swirling air movement within the ante-chamber is caused by designing the chamber as a sphere or cylinder and arranging for the throat to enter tangentially. As before, the fuel is injected substantially at right angles to the direction of the air movement.

General turbulence is caused when the throat is placed centrally, or at any rate without tangential bias. This type

is seldom used in high-speed engines, except with an air cell, though it survives in marine and stationary engines with horizontally opposed valves, a direct descendant of the original Akroyd type.

An air cell, which may be associated with any of the foregoing types, takes the form of a small pocket connected to the combustion chamber. Its purpose is to set aside a part of the air charge during the compression stroke, so that it cannot take part in the primary or first-stage combustion, but emerges as the cylinder pressure falls during the

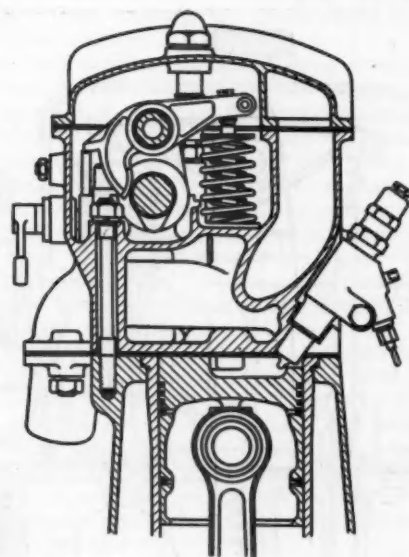


Fig. 3—Direct-injection Chamber, using Turbulent Air Movement

expansion stroke, to assist in cleaning up any stagnant areas in the secondary combustion, as described later.

Air cells are seldom used in direct injection chambers, at any rate in high-speed engines, except in the chambers developed by M. A. N. and Lang. In the latter, the capacity of the air cell is roughly half that of the clearance space, and the movement of the stored air has a dominant effect on the combustion. Air cells are frequently used with ante-chambers of both types, and in the turbulent type the cell is formed as an additional clearance on top of the piston and may contain as much as 70 per cent of the air charge.

In this case, the ante-chamber is usually called a pre-combustion chamber, because the movement of the mixture from the chamber over into the cylinder is greatly accelerated by the pressure created by the primary combustion. This combustion creates a pressure difference which serves to eject the half-digested mixture out into the cylinder. The final combustion takes place during the period of violent turbulence as the mixture emerges from the throat. Contrary to popular opinion, all ante-chambers work with this two-stage combustion, a point which can be demonstrated by adding an external air cell, which will not be found greatly to affect the performance.

Where an internal air cell is used, in the cylinder head, it is generally fitted with a valve so that it may be cut out to provide a high compression ratio for starting.

The direct-injection chamber has been described above as one in which the piston forms one side of the combustion space. In automotive practice, the cylinder head is usually flat and it is possible to go farther and to say that the combustion space is formed in the piston crown. There is much to be

said for keeping the head as simple as possible, while the piston top is comparatively easy to machine. At the same time, its high working temperature is very useful in ensuring rapid and complete combustion.

There are two main types of direct-injection chambers using air swirl, and in the first of these the sprayer is placed on or nearly on the cylinder axis, while the fuel is injected radially outwards. Consequently, the piston top must be designed to bring the greatest proportion of the air into the line of fire of the jets, to pass the air through this field of fire as the piston moves up during injection, and to afford the longest possible run for the fuel, while shielding the walls from any fuel which may overshoot. Clearly, an ordinary concave-topped piston will not do and a fairly deep, pan-shaped chamber, preferably with the centre domed up to fit the spray cone, as shown in Fig. 1, is required.

In one variation of this shape the walls are definitely undercut, to ensure that none of the fuel can splash onto the cylinder walls. This also increases the velocity of the last-minute rush of air over into the cup as the piston approaches the cylinder head, which tends to drive the finer particles of fuel down onto a hot-spot placed in the centre of the piston crown, so that the fuel is ignited immediately on its arrival in the cylinder. This idea of fuel separation by secondary air currents is important.

The air swirl, which is required to circulate the air charge past the jets, is derived from the momentum of the inflowing charge. Even in the conventional two-overhead-valve cylinder, the inlet valve is offset and some swirl is present, but in the oil engine a very high air velocity is required, and it is necessary to make use of a screened

valve, a streamlined port, or both. Fig. 6 shows an inlet valve of this type and the means used to prevent its rotation. In central sprayer engines, however, it is possible to dispense with the screened valve and to rely on the streamlined port alone. The valve should be ample in size, with a port diameter about 40 per cent of that of the cylinder, while the

port should be shaped as a nearly horizontal venturi having a minimum sectional area just under 10 per cent of that of the piston. The exhaust port may be slightly smaller than usual and must be shaped so as to permit adequate cooling of the nozzle.

Nozzle Design

Turning now to nozzle design, this must be carefully related to that of the piston contour and the rate of swirl. We are concerned with the jet cone angle, the number of holes, and their dimensions. It will be found that a cone angle of 150 deg. affords a satisfactory piston shape and engine performance. The number of holes should be selected in accordance with the swirl speed, and assuming an injection period of 25 deg. at full load, the swirl speed theoretically should be $360/25$ or 14.4 times the engine speed, divided by the number of jets used.

This figure would be more useful if we had some idea of the swirl speed, but it will be found practically impossible to obtain accurate data in poppet-valve engines. The type of inlet port described above has been found to give good results with four holes, while, if a smaller number is desired, three holes may be used with a screened valve, and two holes with both in combination. No more than four holes should be used as, owing to their small diameter, the risk of clogging is increased. Each hole is about 0.012 in. in diameter and 0.016 in. long, and if the number is reduced, the length must be increased to give a higher penetration through the more rapidly moving air.

It is clear that a high degree of accuracy and finish is required in nozzles of this type. The material must be exceptionally hard to resist jet erosion, which latter results in increased penetration, impinging of fuel on the piston, and a smoky exhaust. It is this condition which limits the useful life of these nozzles. Owing to its position in the head, the nozzle receives no air cooling and very little water cooling, and the design of the nozzle, the nozzle holder, and the sprayer boss all require careful attention, if maintenance troubles are to be avoided. This is not a suitable type of nozzle for air cooling.

The chief feature of the performance of engines of this type is the exceptionally low fuel consumption. The maximum torque output is satisfactory and is developed at about 1000 r.p.m., which gives a good road performance in spite of the fact that the speed range is limited to some extent, as shown in Fig. 7. The chief reason for this limitation is the difficulty in keeping the rate of swirl, the rate of injection, and the penetration in step under widely varying conditions, while the air volumetric efficiency is reduced to some extent at high speeds by the restriction in the inlet throat which promotes swirl. The maximum fuel pump delivery per cycle must be fixed

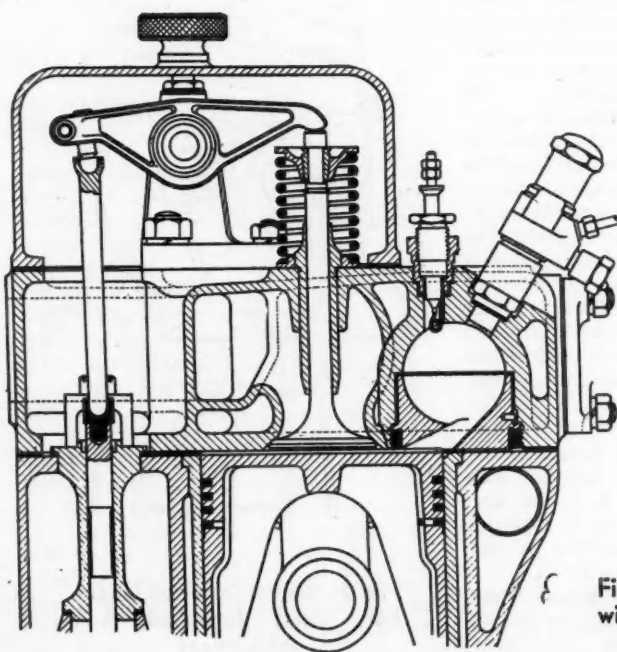


Fig. 4 — Antechamber, with Swirling Air Movement

to give a reasonably clean exhaust at the worst condition, that is, at high speed, so that the maximum torque output at medium speed is somewhat curtailed. For example, if it were possible to reset the pump at 1000 r.p.m. to give maximum output at this one speed, the peak value shown in the curve in Fig. 7 could be raised to about 111 lb. per sq. in. brake mean effective pressure. This condition can be met by designing the fuel pump volumetric characteristics to suit the engine, or by supercharging.

The excellent fuel consumption shown by engines fitted with this type of combustion chamber can be explained on the grounds of its compact design and the fact that, owing to the fine pulverization of the fuel, combustion is very rapid, so rapid, in fact, that, unless great care is taken in the details of the design, the engine is extremely noisy when pulling. Again, after-burning cannot be tolerated in direct-injection engines; it is necessary to burn the fuel efficiently or its carbon will survive to advertise its presence as black smoke in the exhaust gases. These same factors lead to exceptionally good starting qualities which permit the compression ratio to be reduced to about 14.7 to 1. The chief defects of engines of this type have been noisy running, dilution of the lubricating oil with raw fuel, and rapid erosion of the jets. As indicated above, all these can be overcome, so that there remain the objections of a comparatively limited speed range and a complex design of nozzle.

This type of combustion chamber consists essentially of a central sprayer chamber with one single fuel jet, which is, for convenience in design, moved out to one side so that the fuel is projected inward rather than outward. It is a "law" of combustion chamber design never to inject fuel across the axis of a swirl, so the piston cup is made deeper and narrower until the fuel can be directed downward and parallel to the wall, as shown in Fig. 2.

At the beginning of its development, the cup was cylindrical in shape, but it was later found that a conical pot with sides sloping at 15 deg. has certain advantages. For one thing, the finer particles of fuel are kept well away from the axis of rotation, toward which they appear to gravitate, while the larger drops penetrate inward toward a zone of reduced centrifugal pull. At the same time a more accessible position is available for the sprayer.

The depth of the cup is best made rather less than its upper diameter, which affords a good run for the fuel spray and a satisfactory length of piston. It is dimensioned to give a compression of about 15.5 to 1 in a cylinder of this size, allowance being made for the piston top clearance.

This type of chamber obviously requires a high rate of swirl, which is easily obtained in engines having sleeve or piston valves. In poppet-valve en-

gines this rate can be approached sufficiently close by using both the streamlined port and screened inlet valve already described. The exact arrangement is best determined by the use of a wooden model of the head and a spinning vane which is driven by low-pressure air, a device which gives comparative results.

The sprayer is placed so that the nozzle is parallel to the side of the cup and only about 8 per cent of the larger diameter away. It has a single axial hole about 0.020 in. in diameter and is exceptionally long so as to give

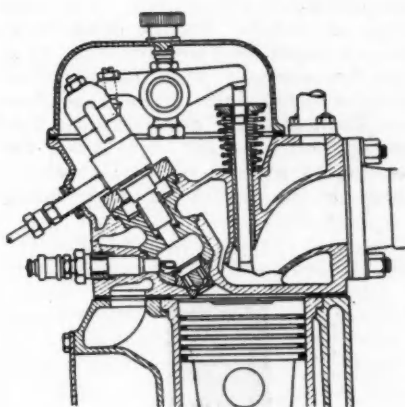


Fig. 5—Pre-Combustion Chamber

a very high penetration. Either a conventional closed nozzle or an open nozzle, with one or two ball valves, may be used. The tip of the fuel jet must just touch the bottom of the cup at a point one-third of a revolution downstream from the nozzle. Clearly, a single-hole nozzle with drilling as large as this is practically clog-proof, and erosion can make little difference when the penetration is already extremely high. This is a distinct advantage as compared to the central sprayer nozzle.

As in all direct-injection chambers, the sprayer is rather difficult to cool effectively, although its offset position makes it possible to provide adequate valve ports without difficulty.

The performance of this chamber, which is also shown in Fig. 7, is not quite so good as that of the central sprayer type, probably because the fuel is not spread so evenly throughout the chamber, and combustion is therefore inclined to be slow. For the same reason, the speed range is somewhat limited in large cylinders, although 50-cu. in. cylinders give a good performance up to 2700 r.p.m.

The great advantage of this is that the combustion is exceptionally quiet under all conditions. It appears that the entering fuel is immediately separated by the centrifuging effect of the rapidly swirling air. The smaller particles are whirled off to the center of the pot, and as this is a hot and comparatively quiescent zone, combus-

tion is soon under way. The flame in traveling outward and upstream toward the fuel jet, is continually running into the larger drops, which have been centrifuged outward, and finding it more and more difficult to build up a rapid and noisy combustion. This type of combustion chamber rather upsets the popular idea that delay in ignition is invariably associated with noisy running. The delay is large, so much so that about 55 per cent of the fuel is already in the cylinder when combustion shows on the indicator card at 1600 r.p.m. and yet the rate of pressure rise is very moderate and the running of the engine is very quiet indeed.

In spite of this advantage and the extreme simplicity of the piston shape and nozzle design, this chamber has only been produced commercially by one manufacturer, possibly because its details require careful development and correlation. A combustion chamber exactly similar in principle, though very different in design, has been used with great success in opposed-piston two-stroke engines. In this case, the fuel is projected radially inward and the combination of a very high rate of swirl and low penetration serves to prevent it from reaching the center of the cylinder.

This type of direct-injection chamber is distinguished from the foregoing types by the fact that no swirl is used. A general air turbulence, coupled with a wide dispersion of the fuel jets, is relied upon for mixing. When used in larger cylinders, of some 400-cu. in. capacity, in conjunction with a "common-rail" injection system and mechanically operated fuel-injection valves, this type of chamber has given excellent results. As, however, its performance depends upon the ability of the fuel to search out the air, it is much handicapped by having to work with a jerk-pump system, no satisfactory common-rail mechanism having yet been evolved for small multi-cylinder engines.

In its earlier form, this type of combustion chamber was usually shaped as a shallow cone in the cylinder head and a slightly concave piston top. More recently, the piston has been carved away to fit the line of fire of a number of horizontal fuel jets, as shown in Fig. 3. Engines using this chamber have suffered greatly from their violation of a "law" to the effect that the fuel must never be injected horizontally in a direct-injection chamber. It is quite possible, however, to design the piston so that a secondary airflow caused by the approach of parts of the piston to the cylinder head, will serve to deflect the finer particles of fuel toward the hottest zone, causing prompt and quiet ignition. Even so, the compression ratio should be kept well up, say at 15.5 to 1.

The nozzle is very similar to that used with the central sprayer type, the four or five 0.012-in. holes being drilled close together in one plane. Incidentally, the holes must not be too

close for drilling, and this limits the minimum spread of the jet "fan." The performance given by the manufacturers of an engine of this type is shown in Fig. 7.

This type of chamber has not been widely used, on account of noisy running, and several engines have been developed in which it is associated with an air cell in order to overcome this defect, and to permit the use of a simple nozzle. The two Lang chambers are of special interest as, in these, the air cell is so large—containing from 45 to 55 per cent of the total air charge—that it has a dominant influence on the combustion. In the later type, the Lanova, the outflowing air from the cell is directed so as to build up local swirls.

A different arrangement, much used in marine engines, is that in which the combustion space is formed between the heads of the horizontally opposed valves. In high-speed engines, however, a nob is always added to the piston, so as to simplify the nozzle requirements. Mention must be made also of an interesting two-stroke engine in which the combustion takes place between the heads of three pistons per cylinder. Owing to the phasing of the three cranks, the air charge is moved bodily in the line of fire of the fuel jet during the injection period with a chewing movement.

The Ante-chamber Type

The ante-chamber type has already been defined as that in which the fuel is injected into a chamber which is separated from the cylinder and is connected therewith by means of a more or less restricted throat. The air movement necessary for rapid mixing is created by forcing a part of the air charge through this throat as the piston ascends on the compression stroke. This passage is sometimes formed in part by a nob on the piston which, entering the throat just as the piston reaches to end of its stroke, serves to give a last impulse to the flagging airflow. With this practically unlimited turbulence available, the nozzle need take little part in forming the mixture.

Combustion takes place in two stages, a primary burning within the chamber and a final burning as the charge forces its way out of the chamber in pursuit of the descending piston. The first combustion may be pictured as a selective burning of the hydrogen which leaves a swirling mass of incandescent carbon particles. All the original airflow is now violently reversed, and the burning mass rushes back through the throat with great turbulence; the carbon particles are given every opportunity of finding unused oxygen before it is too late and, falling in temperature, they must be written off as a loss.

This combustion process is the essential feature of the ante-chamber engine and at once accounts for its good quali-

ties and shortcomings. The power output is exceptionally good at high speed, partly because no restriction of any sort is placed on the inflowing air, and partly because a large charge of fuel can be used before the exhaust becomes black, since, no matter how cramped and incomplete the combustion which takes place in the chamber, all the loose ends will be gathered up as the charge emerges into the cylinder. At the same time, the slackening off of the injection system which inevitably accompanies high speeds, including a lengthening of the period and an uneven rate of delivery, is of comparatively little consequence, though still distinctly detrimental to the last ounce of output. On the other hand, the increased surface-to-volume ratio and the intensely high rate of heat transfer to the walls of the throat lead to difficult starting and increased fuel consumption. At the same time, the cleaning-up process referred to above, which is so useful in suppressing

smoke in the exhaust, occurs too late in the cycle to contribute very much to the thermal efficiency. In the direct-injection chamber, the job has to be done right the first time, as there can be no second attempt, and it would not be too much to say that the ante-chamber owes its development to the deficiencies of the injection apparatus, from the days of Akroyd Stewart onward.

In this type of ante-chamber, the design of the piston is of little consequence, as it invariably has a flat top and is brought as near to the cylinder head as mechanical clearance will permit. The valve port diameters may safely be based on conventional formulae for gasoline engines, their timing being normal, with about 16 deg. of overlap.

The ante-chamber and the throat are thus the important parts of the design, and in the swirling type the throat must, of course, enter the chamber tangentially. The chamber may be either spherical or cylindrical (with a length equal to half the diameter), preferably the former; the size is governed by the compression ratio, which may be fixed at 16.5 to 1. A lower compression ratio will give a distinctly increased power output but difficult starting and misfiring at light loads, while a higher compression will give a very satisfactory engine if high power is not required.

The throat may be of circular or D-section, preferably the latter, with the rounded wall blended into the surface of the spherical chamber. Its cross-sectional area is critical, approximating 3.3 per cent of the piston area for good all-around results. Too small a throat gives difficult starting, while a large throat may lead to a poor low-speed performance. The exact area for any given conditions is best settled by trial.

The throat may be formed in the cylinder head itself or may be placed in a separate plug, as in the Ricardo design shown in Fig. 4. This simplifies the machining, as the plug may be made of special heat-resisting cast iron with the throat cast in place, the machining of the half-sphere being located so as to clean up correctly. This also makes it more difficult to provide adequate valve ports and the throat is accordingly sloped at about 45 deg. and the chamber offset about 55 per cent of the cylinder diameter from the cylinder axis.

The fit of this loose plug has given a certain amount of trouble as, even when installed quite loose in the cylinder head, the clearance soon packs up with carbon. This may be overcome by holding the plug in place with a threaded ring, as shown in the figure, or with a soft sealing ring, to prevent carbon from blowing through. In other designs, the head has been made from aluminum alloy in order to provide a high rate of expansion, the plug being held in place by the block. In this case, the cylinder-head gasket



Fig. 6—Screened Inlet Valve

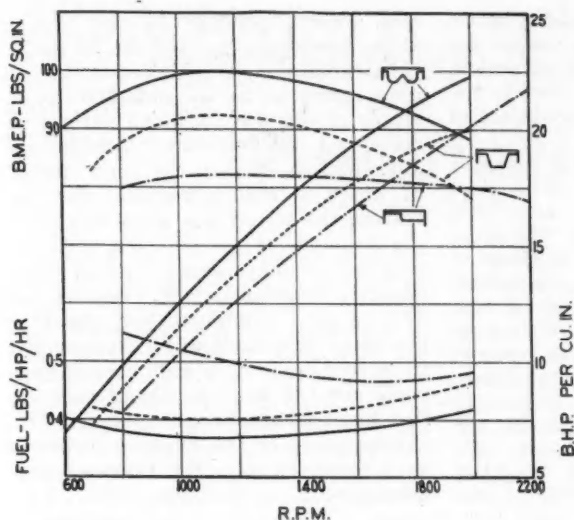


Fig. 7—Performance of Direct - injection Engines

tense thrust of the swirl. The fuel must never be directed toward the throat.

Typical performance figures for an engine fitted with a combustion chamber of this type are given in Fig. 8. It may be said that, in general, all engines using the swirling type of

ante-chamber are difficult to start and require the use of either electric glow-plugs or some device for raising the compression. They are quiet in pulling but noisy when idling—very noisy in fact when the throat is cool. Both the starting and idling noise can be reduced by detuning to the extent of sacrificing 10 per cent of the maximum output, by fitting a slightly larger throat and a compression ratio of about 17.5 to 1.

It has been stated that the nozzles fitted to combustion chambers of this type require less maintenance than those used in direct-injection engines. This may arise from the fact that the correct functioning of the nozzle is of less importance in the case of the ante-chamber, or that its working temperature is lower, partly because of the comparatively low temperature of the chamber (as distinguished from the throat) and partly because of the good cooling of the nozzle boss, which is almost inherent in the design. Given correct design of the direct-injection head from this point of view, this does not appear to be an exclusive advantage.

Almost everything which has been said of the swirling type of ante-chamber applies equally to this class, except that the throat is directed toward the center of the combustion chamber instead of entering it tangen-

tially. Innumerable designs of this type have been produced and developed commercially, but only one arrangement has been used to any extent in automotive engines.

A typical design is shown in Fig. 5, and it will be noticed that the area of the throat is very small, usually about 1 per cent of the area of the piston, while the chamber is assembled from the top. No special precautions are taken to insulate the throat, which is arranged to enter the cylinder at an angle, partly for accessibility and partly to ease the flow of the mixture over the piston top.

Nearly all the chambers of this type work with an external air cell, which is simply additional clearance over the piston. As much as 70 per cent of the air charge was once left outside to act as an air reserve for the final burning which followed pre-combustion in the chamber. These engines were rather difficult to start, noisy in running, and their power output was somewhat limited. With further development, this air reserve has been much reduced.

It would seem that this type of chamber will eventually be superseded by the swirling ante-chamber type, although it will no doubt survive for some years in Germany, where its development has taken place.

Supercharging—Two-Stroke—Air-Cooling

So much for combustion chamber design; it remains to discuss the new factors introduced by supercharging, the two-stroke cycle and air cooling, the use of some or all of which seems inseparable from further progress.

It has been found that all the above types of combustion chambers can be supercharged successfully, provided that it is permissible to allow the maximum pressures to go up correspondingly. If, as is sometimes required in aero engines, the maximum pressure must be limited by delaying the injection, special conditions apply.

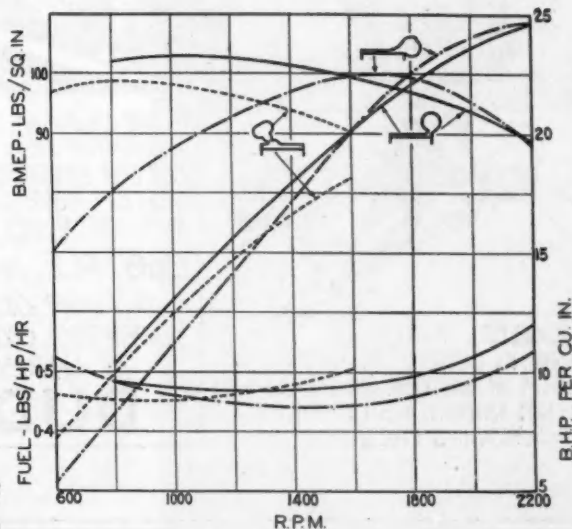


Fig. 8—Performance of Antechamber Engines

must be carefully designed to resist the local explosion pressure, which tends to drive the plug out of the head.

In another arrangement, almost all of the chamber and half of the throat is formed in a separate casting which is inserted in the cylinder head from the side (see Fig. 8). In another, the chamber is formed wholly in the cylinder and the piston is arranged to choke the entry to the throat as it approaches the end of its travel, in order to build up a final increase in turbulence. In yet another design, the same effect is obtained by placing the chamber in the cylinder head and arranging for a nob on the piston to enter the throat just before the inner dead center is reached.

It is, of course, quite possible to place the valves inside the chamber, but this restricts the high-speed performance by requiring the incoming air to flow through the throat. Again, the exhaust valve only, or a combined inlet and exhaust valve, may be placed in the chamber, so that its comparatively high temperature may contribute to the prompt ignition of the fuel. Thus, the number of possible arrangements is limited only by human ingenuity, but it should not be forgotten that the original spherical-pot, cast-in throat engines still outnumber all the newer designs put together.

The sprayer used with this type of combustion chamber is, comparatively, of little consequence. A pintle nozzle is used, as a rule, although it is usually possible to improve the performance by using a single or two-hole nozzle arranged so as to direct the fuel slightly downstream. In the type of chamber shown in Fig. 4, a pintle nozzle is used and the fuel spray is directed toward the center of the sphere at an angle of from 30 to 45 deg. from the vertical, with a slight preference for the latter. The fuel is thus injected toward the center of an air swirl, a proceeding which, usually fatal, is made possible in this case by the in-

The chief obstacle to supercharging is the charger, and until recently designers preferred to provide any required power output by increasing the displacement of the engine, rather than go to the expense of a supercharger. If this auxiliary is to be used, however, there seems to be every advantage in running the engine on the two-stroke cycle, as by this means the weight and cost of this equipment are more than offset by savings in the engine, more especially in the injection system.

The two-stroke cycle introduces a number of new factors which affect the design of the combustion chamber. First, an ample air swirl can be had practically cost-free by the use of tangential air ports, while, if the exhaust ports are also piston-controlled, the cylinder head is simple and easy to cool. In the opposed-piston type, the combustion chamber is usually simply

the space between the two piston heads, and there seems to be no reason for going to any more complicated design. Thus, the two-stroke lends itself to the use of a simple, direct-injection chamber.

Owing to the comparatively low rate of heat rejection of the oil engine, especially at part throttle, it also lends itself to air cooling. Up to the present, the only air-cooled oil engines on the market are of the pre-combustion type, presumably on account of the difficulty of maintaining a satisfactory working temperature at the nozzle. This seems to be the chief problem, and there is certainly much to be said for an open-type nozzle, which, having no closely fitting needle valve, is virtually immune from baking troubles. Aviation will certainly require an air-cooled, two-stroke oil engine, but it is still doubtful if engines of this type can be used successfully on road vehi-

cles, except possibly in the smaller sizes, developing up to some 50 hp.

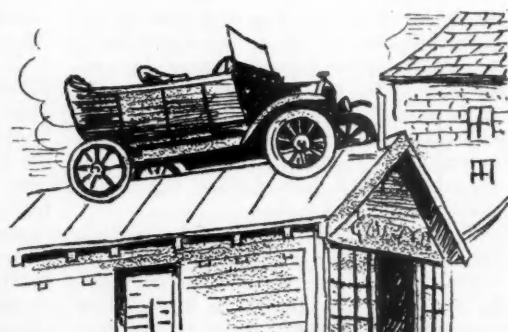
In conclusion, the high-speed oil engine seems to be an outstanding example of the way in which patient development can overcome difficulties and deal with problems the very nature of which is still unknown. For this reason, the writer has kept strictly to the problem of producing a satisfactory performance from a given cylinder at a reasonable cost. Science has not, as yet, contributed very much to the many thousands of oil engines now in service, and it is still necessary to work out the final details of each design by experimental development. This article presents the evidence collected as a result of some ten years of such development, in the hope that it may assist in arriving at a better understanding of the many problems of oil-engine combustion-chamber design.

Automotive Oddities—By Pete Keenan



HOMELESS HECTOR, A CAT IN DUNCAN, B.C. KEEPS WARM IN WINTER BY PERCHING ON HOT RADIATORS OF PARKED CARS, MOVING FREQUENTLY.

CAR OWNERS IN ENGLAND UNDER THE NEW THREE-LETTER-LICENSE PLATE SYSTEM HAVE SUFFIXES SUCH AS BAD, CAD, EGG, ALF, AND BAR. AND POOR OLD ARISTOCRATIC OXFORD IS LABELED DUD



AUTOMOBILE ASSEMBLED ON ROOF OF A REPAIR SHOP IN PABLO, CAL., AS AN AD INCREASED BUSINESS 50%



MUNNIE TIPTON OF SPINDALE, N.C. ALTHO BORN WITHOUT ARMS HE CAN CHANGE AUTOMOBILE TIRES FASTER THAN MOST REPAIRMEN.

Pontiac Connecting Rods Automatically Balanced

MANY of the operations employed in the manufacture of Pontiac connecting rods are similar to those used throughout the industry, such as splitting the rod to form the cap, machining, reaming and rifle drilling of the oil passage. But in the balancing and weighing operations Pontiac has developed a process which automatically machines off the exact amount of metal necessary to produce accurate balance and precise weight.

After the rod has been split to form the cap, the bolt holes drilled and the bolts made fast, the piston bearing drilled, reamed and bushed, the oil passage rifle-drilled and the sides and bearings machined, the rod is taken by an operator who places it horizontally on a delicate scale, Fig. 1. The balancing edge of the scale coincides with the axis of the center of gravity of the connecting rod. When the rod tips the scale, the pointer or indicating hand registers on a graduated indicator the exact amount of metal in fractions of ounces that must be taken off to put the rod in perfect balance about its center of gravity.

Having determined the amount of metal that is to be removed, the operator places the rod in an automatic milling machine, Fig. 2, with a cutter so

placed that the cut is taken from the extra metal that is forged on the bottom of the rod. The automatic device which stops the cutter when the correct amount of metal has been taken off is connected with a balance which has a small pan just below the milling cutters. The operator sets the scale to the exact fraction of ounces of metal to be cut off. The machine is started and the chips that are cut off fall into the small pan. As soon as the weight of the chips equals the amount for which the scale was set, the beam of the scale is tipped, breaking an electrical contact which shuts off the machine.

By a similar process the rod is put on

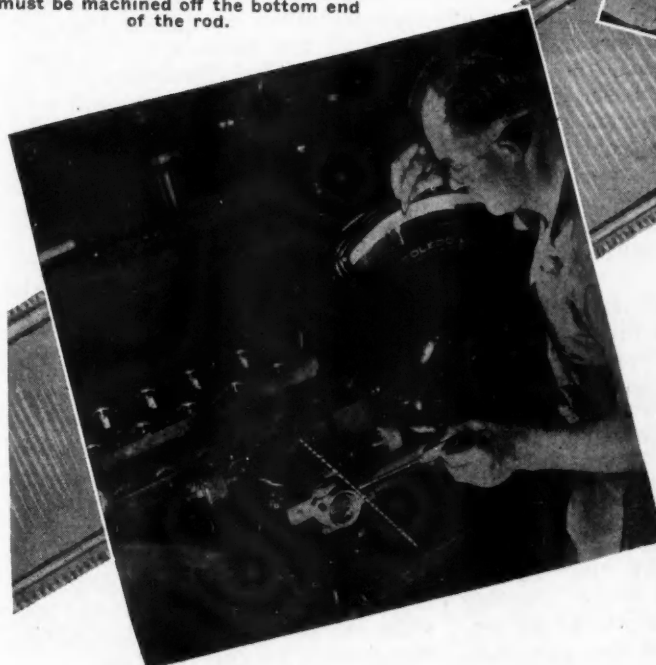
another scale to determine its total weight. Whatever amount it is above the weight allowed that amount is cut off the extra metal forged on each side of the rod just above the lower bearing. Here, also, the milling machine is stopped automatically when the right amount of metal has been removed. It should be noted that the cut taken off each side of the rod is so distributed above and below the axis of gravity that when completed the center of gravity is not disturbed.

All connecting rods are finished within 1/16 of an ounce of the total weight allowed, making selective assembly unnecessary.

Every Pontiac connecting rod weighs the same to within 1/16 of an ounce. Here the final inspector is giving them the final check. The scale on the right registers the total weight, while that on the left indicates the balance.



Every Pontiac connecting rod is balanced accurately about a predetermined center of gravity. The dotted line to which the operator is pointing indicates the axis of the center of gravity. The pointer of the scale registers the amount of metal that must be machined off the bottom end of the rod.



With connecting rod in place, it is moved up to the cutter above the small pan to which the arrow points. The weight on the beam of the scale above having been moved out to indicate the exact amount of metal to be machined off, the little pan catches the machining chips and tips the beam when the correct weight has been cut-off thus breaking an electrical contact and shutting off the machine.



The Forum

A Boost for Short Wheelbases

Editor, AUTOMOTIVE INDUSTRIES:

I have read your condensed article, giving the salient points of L. P. Kalb's S.A.E. paper, which you published in your June 23rd issue, and found it of great interest perhaps because the points stated agree very well with some of my own idle-hour mental speculations.

However, my approach to the problem was from a different viewpoint. The biggest problem confronting today's motorist is not how much speed or power or expense, but how to find a parking place when he has reached his destination. Next to this he desires to travel with the greatest possible comfort.

Unfortunately, the automotive engineers have almost totally neglected the parking problem and probably expect the highway engineer and city planner to furnish the solution. There are limits to available space and funds which the latter cannot exceed and it is past time that the automotive engineers did their part. When they build automobiles with about 120 in. wheelbase and then put on fake streamline radiators and tails which project perhaps four feet beyond the tires, they make it difficult for the motorists to park their product, and, once parked, he has stolen space which might be used by another motorist.

We need automobiles with as short a wheelbase as possible, and with the very least possible overhang ahead of the front tires and behind the rear tires, that is, a minimum overall length. As I see it, independent wheel suspension is valuable as a means to reduce unsprung weight and make the short wheelbase car as easy riding as the present archaic models which use about half of the wheelbase for the power plant and perch the passengers in a box over the rear axle. Likewise, the use of horizontal opposed cylinder engines makes it possible to get the power plant out of the way and seat the passengers amidships where they will get the best riding qualities.

I have driven long-wheelbase cars for years and had trouble finding

parking space for them. My present 1928 model with 122 inches wheelbase will be replaced just as soon as some farsighted manufacturer is ready to sell me one that will meet the requirements stated above. Until that time it will still give me satisfactory transportation.

PAUL N. FRANCIS.

"The First Chevrolet"

Editor AUTOMOTIVE INDUSTRIES:

I have just received AUTOMOTIVE INDUSTRIES for September 1, and on page 269 I note a picture stating that the first car to carry the Chev-

rolet name was built in an upstairs flat in Detroit, in the spring of 1909.

This statement is not quite correct. I happened to be the engineer who designed that car with Louis Chevrolet, and I drew the first line on the drafting board for the first Chevrolet the 15th of March, 1911. It was not in an upstairs flat, but in quite a large upper story above a garage on Grand River Avenue, just a little above Trumbull Avenue. We had the first motor running forty days later, and the first car running in the middle of the year.

E. PLANCHE,
Consulting Engineer, Detroit.

Does the Parts Industry Need Its Own Labor Board

(Continued from page 379)

geographical analysis presented previously in this article, the parts industry probably would come within the latter requirement, but whether it would meet the former is at least open to some question. The Board indicated where an industry could not meet these requirements rather than set up a separate board for it, it was better to handle its disputes through the regular regional labor boards. The Board plans a more permanent set-up of these 19 regional agencies by centralizing the responsibility for the functioning of each board in a full-time paid director. Under this plan, the regional boards would hold hearings in key points in their districts. Labor and industry would be represented on them as at present.

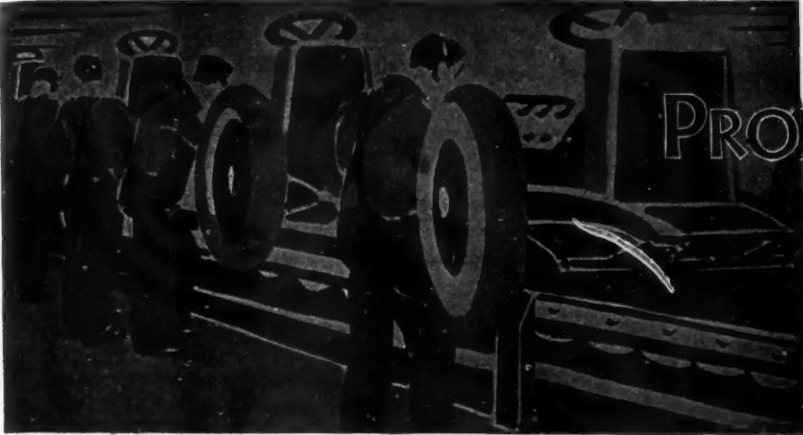
There is, of course, a possibility that a board created on NLRB's recommendation might consider itself bound to a greater or less extent by basic NLRB policies such as the majority ruling of the Houde case.

In that event the opportunities for pacific accomplishment by the regional parts boards discussed here would be severely limited to say the least. Of course, it may be said that this is an issue for the Supreme Court, but a decision from that tribunal will take time, and meanwhile it is doubtful that the regional parts boards could avoid adopting some tentative policy which, for reasons already pointed out, quite pos-

sibly might be that of the NLRB. In this connection it is important to realize that the Automobile Labor Board is in a different position on this issue than the parts boards would be, since the proportional representation policy is clearly established in the President's settlement.

The question of who represents labor might also develop some problems in connection with the naming of labor representatives on the regional panels. This is a matter of considerable importance, since such representatives must have the confidence of the workers if the panels are to function effectively, and, on the other hand, employers will want to feel sure that the labor representatives really represent. However, it is thought this problem could be met by asking representative labor organizations, A.F. of L. unions as well as works councils, in each area to make nominations, subject to the approval of the Federal Administrator.

A mere settlement of the Houde Engineering and Guide Lamp cases as to union recognition, majority rule versus proportional representation, etc., will not solve the problems in this industry's relations with labor. There is a constantly growing need for impartial adjudication of mutual problems. The plan discussed here is perhaps not the best one possible, but at least holds potentialities that justify its careful study.



PRODUCTION LINES

On the Job

Industrial machinery division of the Dept. of Commerce has become a beehive of activity under the aegis of R. E. W. (Bob) Harrison. The department is forging the link between the user and maker of industrial equipment with great profit to both. If you have a machinery problem put it up to Bob's department.

Extraordinary

We will be able to tell you soon of one of the most extraordinary production lines in the industry. It's a case of a small volume manufacturer utilizing what may be termed special purpose equipment of a high order of specialization. The difference is that this equipment is so flexible as to permit tooling changes two or three times a day. We can hardly wait to tell you about it.

Odd Wrinkle

A certain parts plant has a novel scheme for handling a tungsten-carbide boring operation. First is the problem of maintenance and conservation of the special tools. Then is the matter of frequent changes in set up due to a variety of bore sizes. They solve both problems by turning over the entire job to the tool grinder mechanic who does all the work in his special tool room. The man is a specialist, higher paid of course, but they save plenty.

For the Book

Prominent ignition manufacturer specializing in magnetos for industrial use is faced with a problem. The new line of machines is so well constructed and so easy to maintain that it's beginning to affect revenue from replacements. Making it too good has its drawbacks.

Blessed Event

Before long one of the Detroit specialty machine builders is going to be out with a die-sinking machine. Its main object in life will be to cut the cost of making forging dies and small dies of that general character. We haven't seen the machine, but its makers claim great things. The final announcement should be of more than passing interest to the tool engineers in the automotive industry.

Ford Building

We learn from the current bulletin of the Copper and Brass Research Assn. that the Ford Building at the World's Fair uses thousands of feet of decorative panels of chromium plate on copper sheet. It's a new material called Apollo Chrom-Copper. Very thin sheets of copper are chrome plated, cemented to plywood, the edges turned over and fastened to the reverse side which is backed up with a thin metal sheet. One feature of the panel is the fact that the chrome plate is produced in a soft, satin sheen, less glaring in direct sunlight but just as resistant to tarnish.

Zinc-Coated

The Inland Steel Company has just published a folder describing the uses of Inland Zinc-Alloy steel sheets. These sheets are zinc coated but are distinguished from galvanized sheets. By the process of coating, the zinc is alloyed to the steel base. There is no distinct dividing line between the zinc and the steel. The sheet is said to withstand fabrication and rough service without flaking, and also will withstand high temperatures. Finishes such as paint, art lacquer, and enamel adhere firmly, combining beautiful finishes with the rust protection of a zinc coat.

On Lubrication

See *Lubrication*, Texas Co. publication for August, if you are interested in the lubrication of heavy metal forming machinery. In brief but comprehensive form this bulletin goes deeply into the requirements of lubricants for this type of equipment; also a discussion of current methods of maintenance.

Light Weight

What is the place of high-tensile steels in transportation? For a brief discussion of this see the new U.S.S. bulletin, "For Light-Weight Construction—USS High-Tensile Steels." It describes a number of useful grades, gives their physical properties, and tells something about working them. Just what you need for a quick reading.

AC Light

One of the ignition makers has developed an AC generator of low capacity to supply lighting current for farm tractors and industrial equipment used for night operation. The most important feature of this machine is an inherent regulation that results in foolproofness.

Adds Life

In the meantime a great many machine shops are saving oodles of money by chrome-plating drills, reamers, gages, and the gamut of small tools. Some time ago this was considered simply a new-fangled notion of doubtful merit. But that didn't fool anybody. Today, the chrome plating of small tools and its application as a salvage operation in the tool room not only is established on a sound basis, but is bringing in dividends.—J. G.



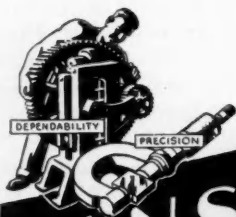
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YEARS

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**LANSING
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LANSING, MICHIGAN

September 29, 1934

NEW DEVELOPMENTS

Automotive Parts, Accessories and Production Tools

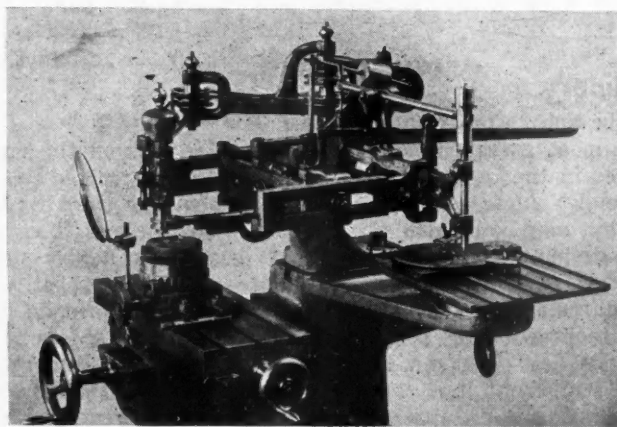
Diesinking-Profiling- Engraving Machine

The cavities in forming, stamping, or forging dies as well as raised and sunken letter name plates, molds for the synthetic plastic industry, for automotive accessories, embossing rolls and various other kinds of work with raised or sunken profiles can be engraved or milled out on the three dimensional No. H-3 Marquette Universal Diesinking-Profiling Machine, made by the Marquette Machine Company, 6527 Vernon Avenue, Chicago, Ill.

A full sized or enlarged model, or master, of the cavity or profile to be produced in the die is mounted on the

graphic system of levers, or if used automatically through gears and worms, etc., can be so adjusted that the rotating cutter will have the same movement as the point of the tracer, which moves over the surface of the model, giving an exact 1-1 ratio, or any desired reduction up to 10-1.

The two dimensional pantograph arrangement, which provides for movements in the horizontal plane, is similar to that commonly used for flat work. The pivoting points are provided with SKF ball bearings, and the cutter-spindle runs in adjustable bronze sleeves, provided with SKF ball bearings. The system of levers that causes the cutter-spindle to be raised and lowered vertically, in synchronism with the



tracing table of the machine. This model or master serves to guide the cutter-spindle by means of a pantograph system.

In forming such a cavity in a die or mold, an enlarged or a full sized master 1-1 is placed on the tracer table, and the tracer is then guided over the surface.

The model can be made of fairly soft material, such as plaster-paris, lead, wood or other soft material, which reduces the cost of making expensive templates or masters. The panto-

vertical movements of the tracer point, is shown. One of the pivoting levers has its outer end connected to the upper end of the tracer, or if used for the electrically controlled tracer system, it is connected direct to a lead-screw, which can be adjusted for various speeds, etc.

The electrical tracer system is provided with a dual point, which causes the reversing motors by a slight touch of the tracer against any irregular form or shape to be controlled through a system of relays.

Laminated Profile Gage

The Stockton profile gage which has been offered to the automotive industry for several years by the Stockton Profile Gauge Corp., Lowell, Mass., has found many varied applications.

The gage is composed of many slotted laminations made of aluminum

(thickness of individual lamination is determined by the model number) held in place by a flat metal bar which passes through all the slots. The result is an instrument capable of producing the most exacting profiles in a minimum of time. Once secured, the profile is locked by means of tension nuts and the gage is designed to lie perfectly flat for scribing purposes.

Automotive Industries

Laminations are available in thicknesses of 0.010, 0.020, and 0.032 in. One of the most interesting applications is the use of a model with a $4\frac{1}{4}$ in. throw with individual laminations capable of taking the entire sweep of a fender, radiator shell or cowl. Other applications include the checking of pattern and die contours, oval or cylindrical surfaces, etc.

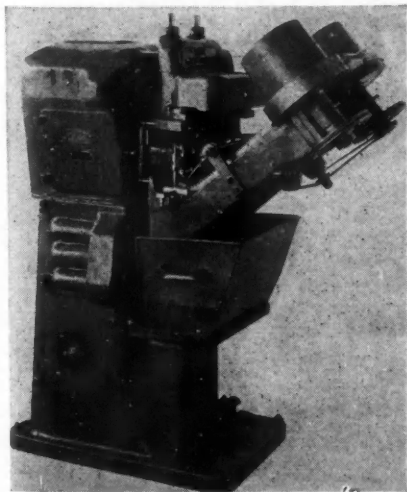
Tapping Machine With Hopper Feed

The Globe Tapping Machine Company, Bridgeport, Conn., has recently developed an automatic hopper feed machine known as the Globe Type "A." It has a production range from 120 to 180 pieces per minute of single hole parts, either tapped, drilled, countersunk, threaded, hollow milled, etc. Rate of production depends upon the size of the part, size of the tap and depth of the thread. Ordinary straight shank high speed taps are used.

The illustration shows the type A machine with two hoppers, six chutes and six ball bearing tapping spindles. This machine was built for a large manufacturer of special nuts and was arranged for a special type sleeve nut having a 10-24 thread $7/16$ " deep. A quantity of nuts are dumped into two hoppers, and as they revolve the nuts are fed down through the six chutes and are tapped and ejected at a rate of 150 complete nuts per minute. A similar machine was constructed for one of the large automobile concerns and was arranged for countersinking automobile parts at a rate of 150 complete per minute.

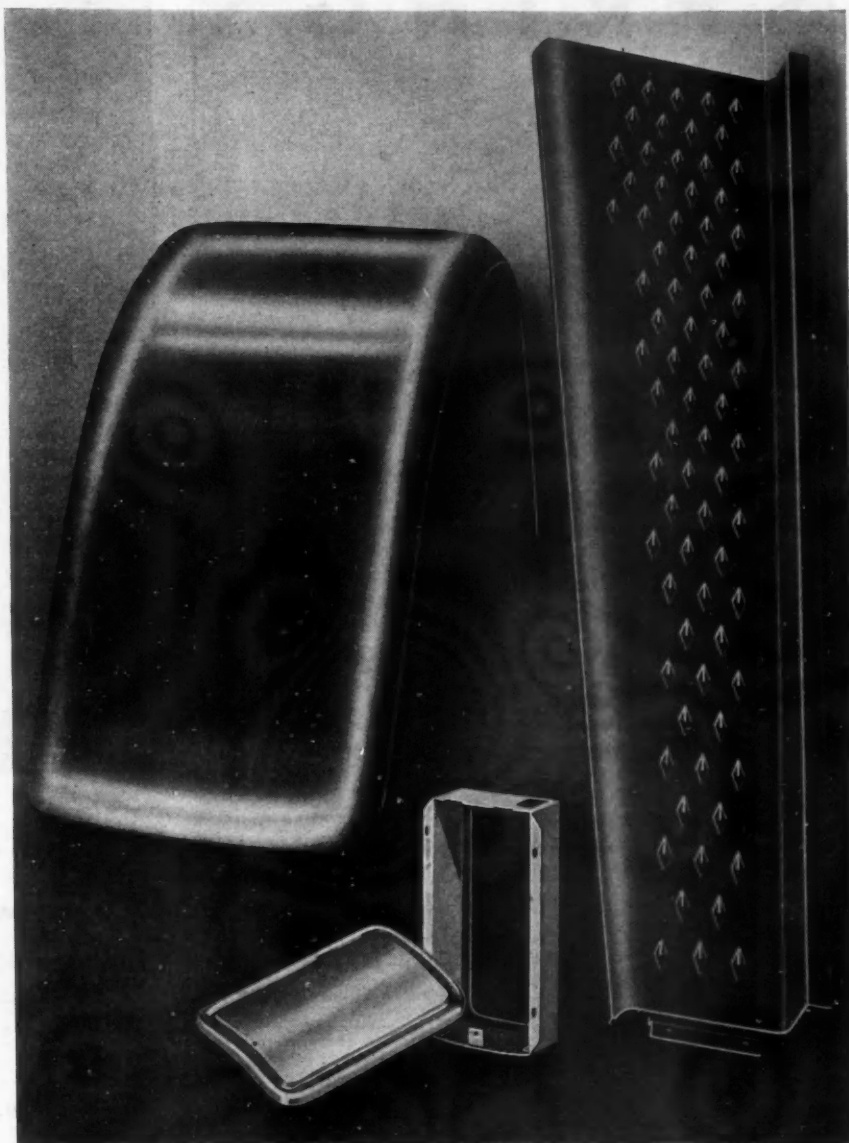
Several different types and sizes of parts can be handled if necessary merely by changing the chutes and an adapter ring in the hoppers and re-locating the spindles which are adjustable for location. The spindles are so constructed that the tap follows its own lead, permitting the use of different sizes on the same machine.

Drive is from a 2-hp. motor mounted on a tilting plate in the rear base. From the motor, the drive is by belt to the clutch pulley on the upper rear of the machine.



Automotive Industries

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September 29, 1934

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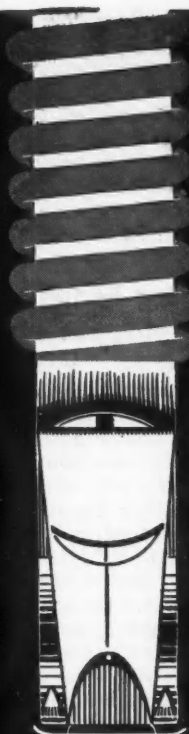
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See Alphabetical List of Advertisers on Page 40

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September 29, 1934

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Automotive Industries